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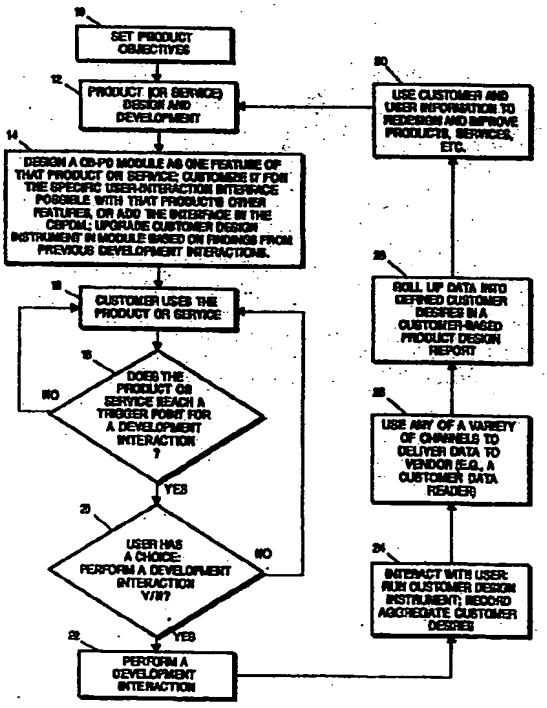
(57) Abstract

A network of data processing-based and telecommunications-based apparatuses and systems (14, 24, 26, 30) are disclosed, including a product sub-system that interacts with a user, gather information from the user, communicates the information to the product's vendor, and receives new pre-programmed interactions from the vendor for future interactions with the user. In addition, other components of this invention include a data processing system for constructing and downloading (243) pre-programmed interactions to the product sub-system; a communication sub-system for transmitting the data directly from the product sub-system to the vendor's computer (326, 328); a communications apparatus for reading the product sub-system's data, transmitting it to the vendor's computer (326, 328), and downloading (243) new pre-programmed interactions to the product sub-system; a data processing system that resides in the product sub-system and conducts numerous types of interactions with a user; and a data processing system that resides in the vendor's computer (326, 328) and analyzes and reports the information gathered from users.



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CUSTOMER-BASED PRODUCT DESIGN MODULE

Background of the Invention

This Customer-Based Product Design Module invention uses a combination of computer hardware, software and communications technologies to construct a module that is built into certain products and services, to establish a network of customer-vendor-distributor interactions and communications. These make possible new customer roles in the design and development of products and services, and customer-vendor relationships. Over time, this may produce a gradual transfer to customers of commercial direction and market control, both in individual cases and in aggregate, from vendors and distributors.

The market research industry seeks to help vendors understand their customers. This invention may enable some vendors to learn directly from their customers on an ongoing basis and establish a private two-way product development relationship with them, bypassing some current methodologies. This invention may also produce more accurate information than market research because it learns customer needs, expectations and desires during the use of products and services.

How does this invention accomplish this? Today, microprocessors are often embedded into products as controllers. For example, many new cars have a dozen or more microprocessors inside of them. This invention uses technology to embed a customer-vendor-distributor NETWORKING MODULE into vendor-selected products and services. This technology-based Module becomes a feature of those product and services, but it is a feature that may involve customers in the product design process, and in planning business services so that they serve customer needs better than competitors can accomplish. These are strategic business advantages for many companies.

For products that contain this Module, customers may continuously inform vendors of their current and emerging needs. The vendors of those products may have the best opportunity to respond swiftly to a much clearer view of market opportunities and product problems than they have today. The inventor believes that within a generation it will be normal for many products and services to include this type of Module, so that customers (in aggregate, the market) comes to play a larger role in directing and controlling the commercial development of many products and services.

The closest known prior art is a combination of six areas. When combined, these six areas represent the prior art for this invention:

1. Market Research

Product and service vendors invest considerable money, employee time and corporate credibility to create their products and services. Are they as successful as they want to be? The market research industry has sprung up to answer a host of questions about customers. It is obvious that in spite of these market research efforts, customer needs that remain unknown and unfilled provide constant opportunities for creating and launching new products and services. In addition, many customers use products and services in ways that are not anticipated or fully understood by market researchers.

Why doesn't market research provide greater understanding? In market research, a variety of methodologies are used to segment groups of customers and to show the preferences and desires of the market segments. Typically, market research focuses on gathering either quantitative data (such as demographic information or numerical responses to surveys and questionnaires) or qualitative data (such as from focus groups). One of the main limitations of these research

studies is that they are usually separate from the customers' actual and everyday use of the products and services being investigated.

2. On-line Surveys

In an on-line survey, a subject sits in front of a computer. Generally, this means bringing the subject to the computer that is running the survey software. At the time the subject has been told to complete the on-line survey, the survey software is run and it asks the subject questions. The subject uses a keyboard or mouse to answer the questions. The software records the subject's answers in a data file. After that subject has completed the survey, the software can report those answers. After all the subjects have been run, software can report various compilations of the data set, and provide various analyses of an individual subject, a sub-set of subjects, the entire group, or comparisons between various sub-groups. Over time, a series of on-line surveys can be compiled, and the data may be compared in various ways (such as longitudinally).

3. Field Programmable Logic Devices

Engineers now able to rapidly produce unique, custom programmed chips in their offices using "desktop silicon foundries." An engineer uses a personal computer or workstation to design the chip with commercially available software. A blank chip, in a special box attached to the desktop computer, is programmed in a few minutes. This is by far the fastest and cheapest way to create custom chips that add custom features to products. When a chip design is finished, if only a small number are needed, copies can be made in that "desktop silicon foundry." If many of these custom chips are needed, they can be mass produced in a factory.

4. Hand-held Bar Code Readers

These devices are carried into the field by many types of employees, such as couriers for organizations like Federal Express. These devices gather data from individual products or transactions by means of reading printed bar codes. This data is held in the bar code reader until it is connected to a computer or to a device that communicates with a computer. At that time, function keys are pressed and the bar code reader's data is uploaded to the computer. During that same connection, function keys are pressed and the bar code reader may be reprogrammed by means of downloading new software into the bar code reader's memory.

5. The Calculator

The small, hand-held calculator contains a microprocessor, memory, display, power supply and input buttons. It can be mass manufactured in large enough quantities that these devices can be sold very inexpensively.

6. Smart Cards

The Smart Card is like a calculator with additional memory and functions built into it. It is used for many types of applications, such as electronic ID systems that provide secure access throughout corporate offices, maintaining personal medical or financial account histories, and other single-purpose uses. A number of the prior art for Smart Cards and related devices demonstrate the feasibility of the present invention, including:

(a) Systems for storing and transferring data between persons based on portable electronic devices (4,007,355, 2/1977, Moreno and 4,092,524, 5/1978, Moreno),

(b) A portable element of reservation systems, for receiving, storing, displaying and outputting digital data (4,298,793, 11/1981, Melis et al.),

(c) A credit card with a memory, including plural memory fields, for keeping accounts with predetermined homogeneous units (4,367,402, 1/1983, Giraud et al.),

(d) A data processing card system that may be carried by a user for insertion into external terminal devices, which actuates the data processing card system (4,539,472, 9/1985, Poetker et al.),

(e) A system for transferring electronic funds by means of portable modules which connect to resident units for transferring data between units or to a central computer (4,625,276, 11/1986, Benton et al.),

(f) An apparatus that accepts data from a people monitoring system (which is attached to a television set), stores the data and transmits it to a removable local unit that stores it (4,642,685, 2/1987, Roberts et al.),

(g) A voice recording card can record and reproduce messages, and transmit and receive messages (4,677,657, 6/1987, Nagata et al.),

(h) An IC card for operating machines such as automatic cash machines and ID systems, including a display for displaying stored data, an IC card reader for reading the IC card, and transmitting/receiving means for updating the data (4,746,787, 5/1988, Suto et al.),

(i) An intelligent card that includes a keyboard, display and IC chip, designed to provide secure identification of the card's holder (4,749,982, 6/1988, Rikuna et al.),

(j) A customer service system that stores customer service information in an IC card, and displays it on the card's display, based on menu selections by the person holding the card (4,752,677, 6/1988, Nakano et al.),

(k) An IC card system compatible with a bank account system, including account maintenance, money transfers and the functions of credit and debit cards (4,839,504, 6/1989, Nakano),

(l) A portable data carrier that stores more than one bank and/or credit account number and data, and provides account information by means of a display (4,859,837, 8/1989, Halpern),

(m) An intelligent portable interactive personal data system (4,868,376, 9/1989, Lessin et al.),

(n) A smart card apparatus and method of programming it, including a smart card control program and a data dictionary (4,874,935, 10/1989, Younger),

(o) A method and system for using facsimile machines to perform electronic funds transfer (4,960,981, 11/1990, Benton, et al.),

(p) A portable electronic keysafe system (e.g., a secure lock) that stores data, along with a stand to interface with a computer, and a computer that programs the lock (4,988,987, 1/1991, Barrett et al.),

(q) A data collection system useful for trade shows employing a card containing a memory chip for recording and storing the data of individuals (5,019,697, 5/1991, Postman), and

(r) A portable interactive medical test selector that displays questions to a patient, stores answers and analyzes the answers to recommend appropriate medical tests (5,025,374, 6/1991, Roizen et al.).

What are products and services?

The departure from this prior art comes from a fundamental re-definition: Physical products and many types of services are really high-level concepts that use specific physical designs of products and service concepts to engage customers and attempt to satisfy their needs, desires and expectations. This is inevitably

imprecise, and customers flexibly and individually determine how they will use the products and services that they buy. Thus, any one embodiment of a physical design is temporary and subject to improvements, even though it may look permanent at any one moment.

Vendors typically use market research to discover unfilled user needs and create new product and service designs that might capture valuable market share. The resulting physical products and services are therefore the current conceptual embodiment of a vendor's current knowledge of customer and user needs. As this knowledge is improved, the physical and process designs of products and services are altered. Thus, we propose that the current designs of products and services at any time are a reflection of a vendor's knowledge of customer needs and desires.

Today there are many approaches to competitiveness and the cost of failing to find a successful approach has mushroomed. For example, some world-class corporations use new technologies to capture market share. Others use a constant launching and churning of new product models to attack their competitors' customer-vendor relationships.

This invention focuses on the competitive strategy of having companies work in a partnership with their customers to gain the greatest ability to focus their resources on developing the products and markets that customers want most, so that these companies therefore gain the biggest increases in sales and profits. It suggests that the value of these customer-vendor relationships is one type of crucial business advantage, and this may be expanded by engaging in new types of product development partnerships that may be made possible by this invention.

Needs For This Invention

(Note: this invention's terminology is defined at the beginning of the Preferred Embodiment.)

Simply put, this invention helps vendors and customers by transforming their learning cycle: It compresses the time and steps between setting business objectives, creating effective products and services, and improving them continuously. It also alters their roles: Customers become partners in the improvement process along with vendors and distributors.

This invention's "Customer-Based Product Design Module" (CB-PD Module) generates numerous opportunities for improvements by integrating customers and employees into the design and delivery of products and services. The invention describes a specific new class of product feature that may be added to, or built into, many types of products and services. The CB-PD Module engages Customers in Development Interactions (DI) while products and services are being used. The customers and users provide direct, on-task understanding of their use of the products and services, and of their unfilled needs, to the product vendors, designers and developers. Development Interactions (DI) will take place most often during actual uses of the product or service, which is when most unreported problems and dissatisfactions occur. The results of these Development Interactions (DI) clarify customer needs, improve products, and they may also help solve problems, control costs, and improve services and operations.

Because it automates this process and adds networking to many types of products and services, this invention may help change the cost, economics, methods and desirability of involving customers in the design and evolution of products and services. By automating this process, there are new opportunities to produce valuable

customer-based information that may become low in cost and constantly available. This might transform the overall learning cycle, the very process by which products and services can be improved continuously in the future.

In other words, if your customers and users are telling you directly what has value to them and what doesn't, this becomes a way to manage a business better, to select priorities more responsively, to budget scarce capital and human resources more accurately, to target the points where one's products and services make the most difference to customers, and to increase the company's revenues and profits faster than competitors.

With this CB-PD Module, because of the new customer-vendor partnerships and learning cycle it creates, the result is a different learning cycle based on new kinds of interactive feedback from customers. Over time, if one or more general purpose CB-PD Modules can be productized and modularized for rapid and affordable insertion into appropriate products and services, that will decrease its cost, accelerate the learning process for many companies, and expand management's ability to work directly with their customers to provide valuable new benefits faster than they are able to today.

From this invention's viewpoint, critical management decisions spring from the fact that vendors invest considerable money, employee time and effort to create and market their products and services. One of a vendor's most important questions is, "How can our currently available resources be leveraged to jump faster and farther toward our goals?" Potential opportunities exist at two levels. There are local decisions, such as how to design or improve a specific product or service. There are also system decisions, such as how to

prioritize the relative value of different product and service investment opportunities. With multiple opportunities and limited resources, how can vendors continually identify the best available opportunities for investing in products and services, and for choosing their specific features and user interfaces?

Answering these types of questions, to improve the management of businesses, the quality of products and the satisfaction of customers, are some of the core purposes of this invention.

Summary of the Invention

Role of this invention

(Note: this invention's terminology is defined at the beginning of the Preferred Embodiment.)

This Customer-Based Product Design Module (CB-PD Module) invention is designed to embed a new type of product feature within a range of products and services, helping them evolve into Customer Directed Products (CDP) by means of Development Interactions (DI). The result is a continuous source of Aggregate Customer Desires (ACD) and Defined Customer Desires (DCD) from customers and users while they are using these products and services. This serves vendors as a continuous way to listen to Customers and understand their performance, their needs and their expectations.

The CB-PD Module obtains its findings while customers are in the middle of product uses, during their real situations and needs. This has the potential to transform the role of Customers from remote and only partly understood participants into design partners with vendors. By automating these critical connections, it can produce a faster, more accurate and more profitable partnership between vendors and customers.

With a mainframe computer, minicomputer or a computer network at the vendor, the Defined Customer

Desires (DCD) may be made available on-line. While each organization would decide which managers and employees should have access to this data, the opportunity to expand the connections between customers and both managers and employees is considerable.

At the same time, the CB-PD Module is an unobtrusive product feature. It is largely invisible to vendors and customers except when (1) the vendor sets up this Module, (2) customers engage in Development Interactions during some of their uses of a product or service, and (3) when vendor management receives a processed report.

Description

A CB-PD Module may have varied designs, to fit the functionality of each particular product or service. For a first example, consider a general purpose CB-PD Module. This would be a removable, self-contained module that could be either battery powered or receive its electricity from the product. It includes its own display or speaker for communicating with the Customer; its own keypad or microphone for the Customer to communicate with it; its own microprocessor and memory to run Customer Design Instruments (CDI), interact with the Customer and store the Aggregate Customer Desires (ACD) data that result from those interactions; its own interface to the product to receive signals of specific types of events (such as when the product is turned on and off, when certain product features are activated, etc.); its own means to communicate with the Vendor (such as by an internal modem to link to the telephone network, by a plug to connect to an interface unit like a bar code reader, by a removable chip that stores and carries the data to an external reader, etc.), etc. By including such means, this interactive networking invention could

be mass manufactured and included in a variety of products and services.

For a second example consider a product that includes its own keyboard for entry and a printer for output, such as an electronic typewriter. A CB-PD Module in the typewriter would be programmed to interact with the Customers or users (such as at every Nth time the unit is turned on, like the 10th and each successive 100th time). If the customer agreed to participate in a Development Interaction (D)), the CB-PD Module would print a series of pre-programmed probes on a paper that the Customer inserts into the typewriter, one probe at a time. The Customer would answer each probe after it was printed, by means of the keyboard. To communicate back with the vendor, the typewriter could (1) if the CB-PD Module contained a modem chip and plug, it could be connected to a phone line so it automatically sends its data to the Vendor, (2) print the address for the Customer to mail in the replies; or (3) print folding instructions and then the address right at the bottom of the replies, so they could be folded closed and mailed.

A third example is any equipment that includes playback and recording, such as VCRs, dictation recorder/transcribers, and computer-controlled products (such as a desktop computer or a personal digital assistant). A CB-PD Module would speak or display (on the TV screen) pre-recorded questions (recorded on chip or on a CB-PD Module tape or disk packaged with the product). The answers could be recorded on tape, in digital storage or on a chip. For example, with a VCR, multiple choice probes could be displayed on a TV screen from a CB-PD Module in the product; the Customer would answer by pressing channel number keys on the hand-held remote control sold with the VCR; the answers would be recorded on a tape that the Customer inserts into the

VCR; at the end, the Customer could mail the tape in to the Vendor. Depending on the VCR's recording capabilities, open-ended questions could also be asked, with the Customer providing a spoken or a written reply.

A fourth example is a product that might suffer any type of a problem, breakdown or cause user-interface confusion. The CB-PD Module might have a "Help button" and the Customer would press it whenever there is a problem, suggestion or need that the Customer wants to report. The product would use its native recording capability, the CB-PD Module would use its recording capabilities, or the Customer would be instructed in one of the alternative recording options described below. In the simplest example, the Customer might press the CB-PD Module's Help button 1 to 4 times to answer a 4-part multiple choice question, and the customer replies could be stored in the internal Module. This data could be returned to the vendor by one of the means described in the preferred embodiments, such as by reading the CB-PD Module when the product is returned for repair to the Vendor or to a service center.

The fifth example is when a service is provided, such as a car rental. The CB-PD Module could be voice-controlled and installed under the dashboard of the rented automobile. Customers could provide the Development Interaction (DI) during their use of the service (i.e., the car). Between each customer, the rental company could download the data from the CB-PD Module, or swap it for a fresh one if it were a modular plug-based unit, then download the data by means of separate data reader (see the preferred embodiments, below).

In all of these examples, the CB-PD Module could be re-programmable so that new Customer Design Instruments (CDI) could be put into them as needed.

Usage

Each vendor would decide where and how to use CB-PD Modules in its products and services. This is a complete turnaround system that automates the conducting of Development Interactions (DI) between customers and Customer Designed Products (CDP), followed by their automated analysis into Defined Customer Desires (DCD) and delivery to vendor managers and employees as Customer-Based Product Design Reports (CB-PDR). This results in frequent addition of Customer-based product design recommendations during most stages of a product's life cycle, including:

Uses during product development: As a complete turnaround system, the CB-PD Module can help track the testing of new and prototype products during their development, and provide the output of Aggregate Customer Desires (ACD) and Customer-Based Product Design Reports (CB-PDR) to product managers and designers. This keeps the development team informed of Customer responses and recommendations.

Use in currently marketed products: Once a product is on the market, the CB-PD Module can be used to accelerate future improvements in the product by means of customer-generated suggestions and insights. Specific Customer Design Instruments (CDI) may be used to elicit different information from specific groups of customers (such as by dividing Customers functionally by their product uses, or vertically by their market segments). The speed of this system also plays a role in that it communicates back to the product developers, instantaneously in some cases or at least quickly in many cases, the desires of numerous customers that would otherwise not be known or applied.

Possible impacts from this invention

The first and most important potential impact of this invention could be on the vendor's profits and market share. The CB-PD Module may provide competitive advantages that fit the vendor's needs because, in the end, many vendors develop a product or service for only one reason, and that is to produce sales and profits. This invention offers the ability to demonstrate clearly to decision makers at the vendor company what it is about their product that is, or is not, effective, appealing, useful, etc. to their Customers while their product is being used. In many product life-cycle decisions, these clearly Defined Customer Desires (DCD) could prove to be crucial for the design, marketing, positioning, and future of the product and its specific features.

The second potential impact is that this makes material transformations in the products and services that include this invention. For example, the Defined Customer Desires (DCD) that receive the most attention by the product's vendor may be those that appear to have the largest direct impact on the financial success and marketing performance of the product (or the fundamental goals of the organization, which may or may not be commercial; for example, an educational institution may be developing a technology-based curriculum product to produce certain learning outcomes or performance results, such as new skills in its students, and it may use a CB-PD Module to assess outcomes of its curriculum product during use, helping provide a constant flow of improvement information for this educational and non-commercial "product").

An agenda for product development may thus emerge from customer participation: the sphere of direct involvement and influence expands beyond product developers and internal managers (which is generally the

case at present). Vendor employees may gain a greater recognition of the direct stake that customers have in the products and services that they buy and use. Similarly, customers may recognize the direct stake the vendors have in their ability to perform and succeed with the products they buy. These converging interests may foster a new type of networked relationship that is made possible by this invention.

The question of how to use this invention to improve management is answered by suggesting that vendors may become increasingly customer responsive by means of this invention. This may empower customers to become pro-active in stimulating product improvements, and in communicating their needs to vendors as a normal and largely unobtrusive part of using many products and services.

To the extent that vendors gain bottom-line results and strategic business advantages from this invention, they would demonstrate that critical business strategies include learning from Customers and responding to their needs, improving the performance and effectiveness of their customers, and fitting more accurately into their markets.

If that should happen, it would become increasingly difficult to think of many types of products and services as non-communicative and unresponsive. On-line, networked products (i.e., those with a CB-PD Module, which this invention calls Customer Directed Products) offer a range of expanded two-way, interactive relationships between customers and vendors. Over time, these new relationships might even produce an evolution of free market economies toward increasingly responsive processes (see below for an initial description). If that evolution does begin, the companies that fail to add this type of interactivity to their products (where this

is an appropriate addition added by their competitors) might grow increasingly out of touch with a faster-moving world that includes two-way opportunities to improve products and services rapidly -- a new normal way to do business in a networked world.

Brief Description of the Drawing

The above and other features and advantages of the present invention will become apparent from the discussion below of specific, preferred embodiments presented in conjunction with the accompanying drawings, in which:

Fig. 1 is a flow chart of the Customer Design System (CDS).

Fig. 2 is an illustration of the front view of a Customer-Based Product Design Module (CB-PD Module).

Fig. 3 is an illustration of a Customer Directed Product (CDP).

Fig. 4 is an illustration of a Customer Data Reader/Programmer (CDRP).

Fig. 5 is an illustration of a CB-PD Module directly transmitting Aggregate Customer Desires (ACD) data through the telephone network.

Fig. 6 is a block diagram of a Customer-Based Product Design Module (CB-PD Module).

Fig. 7 is a block diagram of a Customer Directed Product (CDP).

Fig. 8 is a flow chart of the Instrument Design Repository (IDR).

Fig. 9 is a flow chart of the Instrument Design Repository (IDR).

Fig. 10 is a flow chart of Development Interactions (DI).

Fig. 11 is a flow chart of transmission with optional security procedures.

Fig. 12 is a flow chart of the growth of Aggregate Customer Desires (ACD) databases.

Fig. 13 is a flow chart of a Customer-Based Product Design Report (CB-PDR) system.

Fig. 14 is an illustration of a recommendedreporting format for Customer-Based Product Design Reports (CB-PDR).

Description of the Preferred Embodiment

Components of This Invention

To facilitate the description of the invention, it is worthwhile to define some conventions solely for this purpose. These conventions are somewhat arbitrary and should not be construed as limiting to the generality of the invention. For the purpose of this description:

(a) Customer Directed Product (CDP): An interactive product includes a CB-PD Module; a CDP interacts with the Customer, or the Customer may initiate interactions with a CDP; these interactions are by means of the CB-PD Module.

(b) Customer Design System (CDS) is the overall, interactive system by which the Customer provides design information to a Vendor.

(c) Customer Design Instrument (CDI) is a specific set of Customer Probes (CP) that are intended to elicit the raw data, which are called Aggregate Customer Desires (ACD).

(d) Customer Probes (CP) are the prompts, questions, etc. stored in a CB-PD Module for interacting with a Customer.

(e) Instrument Design Repository (IDR) is a stored set of Customer Probes (CP) that are available, as an authoring system, for use in constructing Customer Design Instruments (CDI). It also stores Customer Design Instruments (CDI) that may be reused or modified to produce new Customer Design Instruments (CDI).

(f) Aggregate Customer Desires (ACD) are the raw data that results from customer use of the CB-PD Module.

(g) Customer Data Reader/Programmer (CDRP) is a hardware device used in the collection and/or transmission of Aggregate Customer Desires (ACD) data to a Vendor, and in programming the CB-PD Module.

(h) A Development Interaction (DI) is the actual event when a Customer interacts with a Customer Directed Product (CDP).

(i) Vendor Initiated Interactions (VII) and Customer Initiated Interactions (CII) are two types of Development Interactions (DI) that are described in the preferred embodiment; other types are possible, and some are listed below.

(j) Defined Customer Desires (DCD) are the analyzed findings that result from customer use of the CB-PD Module in a Customer Directed Product (CDP).

(k) Customer-Based Product Design Report (CB-PDR) is an automated, structured report system that analyzes and presents the Defined Customer Desires (DCD).

<u>The Parties In This Invention</u>

To facilitate the description further, it is worthwhile to define some of the players in the product design process that is envisioned by this CB-PD Module invention:

(a) The Customer is the person, group of people, or company that uses the Customer Directed Product (CDP) and interacts with the CB-PD Module.

(b) The Vendor is the company that sells the Customer Directed Product (CDP), which may be either a product or a service. [Note that a "vendor" may also be an educational institution (such as a university that wants to evaluate the effectiveness of an educational technology curriculum product), a nonprofit organization (such as a foundation that wants frequent client feedback

from a program of one of its grantees, to help improve that program rapidly), a government agency (such as the State Department, which may want a CB-PD Module that helps improve its automated language education laboratories), etc. In other words, the Vendor referred to here may be any type of organization or institution.]

(c) The Distributor is a company that re-sells a Customer Directed Product (CDP) and may add services or support to it. The Distributor may sell to Retailers or directly to Customers. (Retailers are a special category of Distributor who can engage in all the same activities as a Distributor, with respect to this CB-PD Module invention.)

(d) The Service Company is a company that provides post-sale repair or support to the Customer.

(e) The Communications Service Vendor is the common carrier that provides communications services.

For the purposes of this description, both the Products and the Services appropriate for this invention will be referred to as Products. In many types of services it is possible to include a CB-PD Module, such as in the rental of automobiles, during or after the delivery of travel services (such as a stay at a resort), etc. These services may be turned into Customer Directed Services (CDS) by means of this invention.

<u>System Description</u>

The product that is manufactured in the preferred embodiment of this Customer-Based Product Design Module (CB-PD Module) invention is a specialized computer module, which on occasion is similar to a "smart card," including internal software and the optional of external software. This Customer-Based Product Design Module (CB-PD Module) is applicable to a wide range of products and services, and the use of a sub-set of these CB-PD Module embodiments should be construed as included.

Turning now to FIG. 1, the overall Customer Design System (CDS) describes the process by which Customers, by means of the CB-PD Module, can direct, guide or assist the Vendors of Customer Directed Products (CDP), which contain such a module. This process begins with a Vendor setting product, market or other commercial objectives 10 and then designing the product 12. One of the product's features will be a CB-PD Module 14, which will include a custom Customer Design Instrument (CDI) specific for that product. As the Customer uses the product 16, pre-programmed trigger points are checked in the CB-PD Module 18. These trigger points may be initiated by the CB-PD Module or by the Customer. If a trigger point has not been reached, the Customer's use is not interrupted. If a trigger point is reached, the CB-PD Module requests the Customer's participation in a Development Interaction (DI) 20. If the Customer says no, then that trigger point is passed without a DI occurring. If the Customer agrees, a Development Interaction is performed 22. This includes running the Customer Design Instrument (CDI) and recording the Aggregate Customer Desires (ACD) 24, which are comprised of the Customers responses during the Development Interaction. The Aggregate Customer Desires are delivered to the Vendor 26 where they are entered into an Aggregate Customers Desires (ACD) database. Periodically, a report is run 28 which analyzes the aggregate data into Defined Customer Desires (DCD) comprised of the Customer's views and suggestions during that period. This is presented in an on-line or printed Customer-Based Product Design Report (CB-PDR) 28. This Customer information is used to help improve products, services, marketing and other areas of business operations 30, and is fed back into an iterative design 12. Whenever needed, the Customer Design Instrument is

updated 14, and distributed by a variety of means (such as including it in the new products sold) to Customers.

The Customer Design System (CDS) in FIG. 1 provides the Vendors that use it with customer-based product and market development information 30, based on a Customer-Vendor NETWORK 14, 24, 26, 30 that is built into appropriate Customer Directed Products (CDP) 12 by means of a CB-PD Module 14. Vendors may employ this new source of Customer information 30 whenever they wish to improve their product design decisions 12. The Vendors may also use this new information 30 to reduce some of their other types of market research expenses.

The Customer Design System (CDS) in Fig. 1 gives Vendors hands-on Customer-based information 30 that is generated WHILE THEIR PRODUCTS ARE BEING USED. At their moments of greatest need, Customers tell Vendors their perceptions, expectations and the shortcomings of their product(s) and their associated services 24. They are able to communicate 24, "This is what I'm doing to use your product. This is why I need it and why I use it this way. Here are the specific things I'd like you improve, and why they are important to me. I'd also like to tell you how to improve your relationship with me. Here are the important things I'd like you to do now." Since Customer purchases decide those products' adoption, rate of use, success and market share, the type of Customer-Vendor network in Fig. 1 may provide strategic competitive advantages to Vendors interested in increased sales, revenues, market share or profits.

Vendors can use this Customer Design System (CDS) to involve their Customers in guiding and determining:

.What product features to improve and why 12,

.How to improve target marketing's accuracy and effectiveness by clarifying

what has the most value to specific groups of customers 30,

.Sales force insights into the needs of specific customers that assist in winning adoption of their product(s) throughout those customers' business operations 30, and

.Other insights unique to an individual customer, a market segment, or a mass market 30.

It is commonly said that microprocessors are being integrated into numerous products; that computers are disappearing into products. This Customer Design System (CDS) may uncover and enable new strategic business opportunities 30 by means of placing a NETWORK into appropriate products. Strategic competitive advantages may include accelerating these Vendors' abilities to improve their products faster, fitting their products to their Customers and markets accurately, and satisfying Customer needs better than their competitors who do not include a network in their products. Vendors who use this 14, and only these Vendors, have this automated network to work with their Customers and learn from them 24 during product use. With each new cycle of iterative product improvement 12, these Vendors' may leap farther ahead of their competitors in product quality, customer satisfaction, sales and profits.

Since businesses of all types increasingly rely on information technologies for their business operations, how can these emerging technology capabilities be harnessed to improve product quality, revenues and operations faster and more capably than their competitors? This Customer Design System (CDS) assists Vendors in fitting their products to the most important needs of Customers 12 by means of automated interactivity

24 that enlists larger numbers of Customers 20 as design and business partners. Because these Customers provide their information WHILE THEY ARE USING THE PRODUCTS 18, these Vendors may gain the opportunity to fit their products and marketing to Customer needs faster and more accurately than their competitors 12. The Customer Design System (CDS) in Fig. 1 may be integrated as a customer-linked network that is attached to 26 and integrated into 28 the firm's information technology systems, so that this reporting system 28 (which may deliver finished reports that are easy to read and understand) can be provided on-line 30 to numerous managers and employees throughout the organization

Turning now to Fig. 2, the physical apparatus of one embodiment of a Customer-Based Product Design Module (CB-PD Module), which is detailed below, is illustrated. The following represents a reasonably complete set of user interface, electric power and communications input/output (I/O) features; not all of these need to be included simultaneously in any one CB-PD Module. On the front surface of the card 62 there are provided a display 40; an input/output (I/O) communications plug 42; an audio speaker 44; a plug for electric power 46; a microphone 48; a removable memory chip 50; a physical handle for the device 52; a wireless antenna 54; an internal battery for power 56 (which may be a rechargeable battery for portability, a non-rechargeable lithium battery for longer life, etc.); keys or buttons for entering letters and numbers 60; and keys or buttons for choosing functions or operating modes 58. In some cases there are two possible features that perform the same operation (some of these options include entering Customer input via the microphone 48 or by the letter/number keys 60, communicating with the product and/or with external devices via the I/O plug 42 or the

antenna 54 or a removable chip 50, and communicating with the Customer via the speaker 44 or the display 40) and in such cases, only one of these features needs to be employed. In some cases a feature may be required even if it is usually non-essential (for example, if the type of RAM memory is present that requires electric power, then a battery 56 backup is required to power the Module when it is not powered by the product's electricity through the plug 46). In cases where the product contains the means to perform some of these functions, as will be illustrated in another preferred embodiment, it may not be necessary to duplicate those features in that product's CB-PD Module.

The special purpose function keys 58 include labeled buttons for those interactions needed in any particular CB-PD Module. Some of those functions may include transmitting or receiving data via the I/O plug 42 or the antenna 54, starting and stopping the recording of a voice message via the microphone 48, playing back stored data via the speaker 44 or the display 40, or quitting a Development Interaction (DI) via a terminate function key 58.

Turning to Fig. 3, the physical apparatus of a second preferred embodiment of the CB-PD Module is illustrated as a complete Customer Designed Product (CDP), a facsimile machine 70. The difference is that this embodiment employs features already built into the product, so its design has been adapted to fit into the physical appearance and functioning of the product. The following represents a reasonably complete set of user interface, electric power and communications input/output (I/O) features based on those already included in this product. In the facsimile machine 70 there are provided a display 72; telephone communications for input/output (I/O) 76; an audio speaker 74; electric power from the

facsimile machine 70; a microphone for Customer input 78; keys or buttons for entering letters and numbers 82; keys or buttons for choosing functions or operating modes 80; and a printer 84. In some cases there are two or more possible product features that may perform the same CB-PD Module operation (some of these options include entering Customer input via the microphone 78 or by the letter/number keys 82, communicating with the Customer via the speaker 74 or the display 72 or the printer 84, and locating function or mode keys on the facsimile machine 80 or on the handset 80) and in such cases, only one of these features needs to be employed. The CB-PD Module in the facsimile machine 70 is therefore able to employ already existing product features 72, 74, 76, 78, 80, 82, 84 and may therefore merge them with the CB-PD Module to produce an integrated product design and integrated product/CB-PD Module operation.

Another physical component in this invention is the Customer Data Reader/Programmer (CDRP) illustrated in Fig. 4. This embodiment of a reader/programmer 92 resembles a credit card authorization terminal. This apparatus includes keys for dialing the phone 100, a handset 94, a display 96, and an optional light 102. The CB-PD Module 106 is inserted into the reader socket 104. There, the Module's electric power may be supplied by the Customer Data Reader/Programmer 92 via the CB-PD Module's plug 112. The connection between the CB-PD Module 106 and the Customer Data Reader/Programmer 92 is via the I/O plug 110. Once the CB-PD Module has been inserted, the operator connects to the Vendor's computer 118 over the telephone line 116 by pressing a function key 98 and dialing the Vendor's phone number on the dialing keys 100. The data exchange from the CB-PD Module 106 may be wholly controlled by the Vendor's computer 118, with the Customer Data Reader/Programmer 92

acting as an interface to the CB-PD Module 106. After the data has been read, the Vendor's computer 118 may download a new program through the Customer Data Reader/Programmer 92 into the CB-PD Module 106. As an interface device, this embodiment of the Customer Data Reader/Programmer 92 may be attached locally and directly to the Vendor's computer (to provide data reading, programming or both) instead of being linked from a remote location via a telephone line 116.

Alternatively, the Customer Data Reader/Programmer may serve as a stand alone device under its own program control. In this case, reading the data would be initiated by pressing a "receive" function key on the Customer Data Reader/Programmer 98 and a "transmit" function key on the CB-PD Module 106. The Customer may be guided through this by prompts or instructions on the display 96, or on the display 108. While the data is being read, the light 102 may be lit to indicate proper operation. Alternatively, a message such as "Receiving data" may be displayed on the display 96, or a message such as "Sending data" may be displayed on the display 108. The operator may then connect to the Vendor's computer 118 over the telephone line 116 by pressing a function key 98 and dialing the Vendor's phone number on the dialing keys 100. The operator may then transmit the data to the Vendor's computer 118 by pressing a function key 98; while the data were being transmitted, a message such as "Sending data" may be displayed on the display 96.

After this data transmission occurs, the Customer Data Reader/Programmer 92 may have a new program downloaded to it by the Vendor's computer 118 for upgrading the program in the CB-PD Module 106. The programming of the CB-PD Module 106 by the Customer Data Reader/Programmer 92 may then be initiated by pressing a

"Send program" function key on the Customer Data Reader/Programmer 98 and a "Receive program" function key on the CB-PD Module 114. The Customer may be guided through this process by prompts or instructions on the display 96, or on the display 108. While the CB-PD Module 106 is being programmed, the light 102 may be lit to indicate proper operation, or a message such as "Program downloading" may be displayed on the display 96, or on the display 108.

Fig. 5 illustrates a second embodiment of the Customer Data Reader/Programmer. In this embodiment, the CB-PD Module 120 contains a standard telephone plug as its I/O plug 122 and an internal modem 130. A standard telephone cable 126 is used to attach the CB-PD Module 120 to a telephone line 124. When the CB-PD Module is connected to the telephone network, this is indicated by a message such as "Ready to transmit" on the display 128. Pressing the appropriate "Send and receive" function key 132 at that time automatically dials the Vendor's computer, transmits the data and receives a new program. An appropriate message may be displayed on display 128 while this is taking place, such as "Data is being exchanged."

Internal Physical Descritions

Fig. 6 shows a functional block diagram of the CB-PD Module in Figure 2. This is preferably a microprocessor-based integrated circuit (IC) of compact and inexpensive design.

The CPU/ROM Memory 146 is a microprocessor plus ROM and RAM memory 158. The memory 158 may be volatile, which requires constant electric power (i.e., conventional DRAM) or it may retain its data without requiring power (i.e., nonvolatile "flash" memory). A separate unit is not specified for physical storage of the Customer Design Instrument (CDI) and the Customer's

Aggregate Customer Desires (ACD) data (i.e., a miniature hard or floppy disk) since memory technology is evolving rapidly. Currently, "flash" memory provides system BIOS; replaces ROMs, DRAMs and SRAMs; and is beginning to replace floppy and hard drives in various systems.

Alternatively, a system of removable physical storage may be employed, such as the removable chip 50 illustrated in Fig. 2. A removable storage method enables the CB-PD Module's control programs to be updated without involving data communications. For example, a removable chip enables the data to be transferred by inserting the chip in a reader capable of downloading the data and updating the Customer Design Instrument (CDI) stored on the chip. If a removable storage method is used, it should be easily removable and replaceable by an untrained Customer.

The keypad 148 may contain sufficient keys for all letters and numbers, or a reduced set. It also contains function keys that provide specific programmed operations (such as transmitting the collected data). The keypad 148 is coupled to ports on the microprocessor to provide digital input from the Customer, which may include any character or function that may be enabled by a key that is programmed in that manner (such as letters, numbers or an "enter" key; more complex operations connected with Development Interactions (DI) such as opening a scratch pad to attach a text comment or suggestion to a particular question; or functional operations such as transmitting and receiving data; etc.).

The display controller 144 delivers ASCII text to the display 142. The display provides menus, instructions, probes, messages and other communications to the Customer. With the display 142 and keypad 148 together, the CB-PD Module is capable of conducting a Development Interaction (DI) with the Customer. This may

be initiated by the Customer or by the CB-PD Module. Memory 158 provides digital storage for one or more Customer Design Instruments (CDI), customer data from Development Interactions (DI), etc. in small data files or in a database of Aggregate Customer Desires (ACD). The power sources 46, 56 shown in Fig. 2 supply electric power to the electronic circuit of the CB-PD Module shown in Fig. 6. An optional clock/calendar circuit 140 may be included to provide a trigger for running Development Interactions (DI), to stamp the time and date of each DI in the Aggregate Customer Desires (ACD) file, to log the frequency of use of the product or of certain features of it, etc.

Alternatively, Development Interactions (DI) may be conducted by means of voice. In Fig. 6 the microphone 152 is connected to an analog-to-digital converter 156. When voice or sounds are entered via the microphone 152, the analog-to-digital converter 156 converts it to digital data which is stored in memory 158. The speaker 150 is connected to a digital-to-analog converter 154. When digital data is stored in memory 158, the digital-to-analog converter 154 converts it to analog data which can be reproduced as voice from the speaker. The speaker may also be used to signal the Customer via beeps, alarms, tones, words or other sounds.

The CPU/ROM memory 146 is connected to an I/O device or circuit which may have various designs. Some of the I/O options include direct connection to a Customer Data Reader/Programmer 176 by means of a connector 174, connection to a telephone line 170 by means of a modem 168, and wireless radio communications by means of a transmitter/receiver 164 and an antenna 166. In addition, there may be connections with communications features already included in the product 172. Regardless of the I/O means chosen, a compact

design and components are preferable. For transmission, the digital data stored in memory 158 can be transmitted 166, 170, 176. For reception, digital data received 166, 170, 176 can be stored in memory 158. By means of an 800# phone call, there does not need to be any cost to the Customer for this call.

Based on the present embodiment, Development Interactions (DI) are recorded during the use of a Customer Directed Product (CDP) and stored in memory 158. When the CB-PD Module is enabled for I/O (based on the method built into the Module 166, 170, 176) and the appropriate function key pressed 58 in Fig. 2, the Module transmits its Aggregate Customer Desires (ACD) data. If the Vendor would like to re-program the CB-PD Module, the new program (such as a new Customer Design Instrument) is received by the Module by the communications method built into the Module 166, 170, 176 and stored in memory 158.

Fig. 7 shows a functional block diagram of the CB-PD Module installed in the Customer Directed Product in Figure 3, the facsimile machine 70. Certain design assumptions have been made: first, the user interface (UI) is based on a combination of voice 74, 78 in FIG 3, display 70 and function keys 80 (though other options are possible, such as the display 70 and keypad 82, or the printer 84 and keypad 82); the I/O with the vendor is based on an internal modem and the telephone line 76; and because of this direct facsimile machine 70 to Vendor telephone connection, the CB-PD Module is not removable and a Customer Data Reader/Programmer (CDRP) 92 in Fig. 4 is not needed.

The CPU/ROM Memory 186 is a microprocessor plus ROM and RAM memory 198. The memory 198 may be volatile, which requires constant electric power (i.e., conventional DRAM) or it may retain its data without

requiring power (i.e., "flash" memory). A separate unit is not specified for physical storage of the Customer Design Instrument (CDI) and the Customer's Aggregate Customer Desires (ACD) data (i.e., a miniature hard or floppy disk) since memory technology is evolving rapidly. Currently, "flash" memory provides system BIOS; replaces ROMs, DRAMs and SRAMs; and is beginning to replace floppy and hard drives in various systems.

The keypad 188 may contain sufficient keys for all letters and numbers, or a reduced set. It also contains function keys that provide specific programmed operations (such as transmitting the collected data). The keypad 188 is coupled to ports on the microprocessor to provide digital input from the Customer, which may include any character or function that may be enabled by a key that is programmed in that manner (such as letters, numbers or an "enter" key; more complex operations connected with Development Interactions (DI) such as opening a scratch pad to attach a text comment or suggestion to a particular question; or functional operations such as transmitting and receiving data; etc.).

The display controller 184 delivers ASCII text to the display 182. Depending on the UI, menus, instructions, probes, messages and other communications may be made with the Customer by means of the display, voice or a combination of both. Memory 198 provides digital storage for one or more Customer Design Instruments (CDI), customer data from Development Interactions (DI), etc. in small data files or in a database of Aggregate Customer Desires (ACD). The power source is directly from the facsimile machine 70 which remains powered at all times to preserve its user-programmed memory; this also supplies electric power to the electronic circuit of the CB-PD Module shown in Fig. 7. Either the facsimile machine's 70 clock/calendar

circuit or an optional CB-PD Module clock/calendar circuit 180 may be included.

Development Interactions (DI) may be conducted by a variety of means that may include communications from the Customer Directed Product (CDP) to the Customer by means of the LED display 72, the printer 84 or voice 74; and communications from the Customer to the Customer Directed Product (CDP) by means of the keypad 82, function keys 80 or voice 78.

In this description of this preferred embodiment, Development Interactions (DI) are conducted by means of voice. The speaker 190, which is the handset 74 (or a speaker-phone if the facsimile machine has one) is connected to a digital-to-analog converter 194. When digital data is stored in memory 198, the digital-to-analog converter 194 converts it to analog data which can be reproduced as voice from the speaker. The speaker may also be used to signal the Customer via beeps, alarms, tones, words or other sounds. The microphone 192 is connected to an analog-to-digital converter 196. When voice or sounds are entered via the microphone 192, the analog-to-digital converter 196 converts it to digital data which is stored in memory 198.

With a combination of the speaker 190, microphone 192, display 182 and keypad 188 together, the CB-PD Module in this embodiment is capable of conducting a Development Interaction (DI) with the Customer. This may be initiated by the Customer or by the CB-PD Module. For example, the speaker 190 could recite a question and a beep could sound at its end. The Customer could recite a reply into the microphone 192 which would be stored in memory 198. The Customer could be verbally told, using the speaker 190, the key to press after finishing the reply. In addition, yes/no, multiple choice, scale

questions and similar types of questions might be enabled by means of the display 182 which might display a message, such as the following for a yes/no question:

First line: "Press 1 for Yes and 2 for No"

Second line: "Press # to end and exit".

For communications, the microprocessor/ROM memory 186 is connected to a modem 204 that is connected to a telephone line 206. For transmission, the digital data stored in memory 198 can be transmitted 204, 206. For reception, digital data received 206, 204 can be stored in memory 198. By means of an 800# phone call, there does not need to be any cost to the Customer for this call.

Based on the present embodiment, Development Interactions (DI) are recorded during the use of a Customer Directed Product (CDP) and stored in memory 198. When the CB-PD Module is enabled for connection to the Vendor's computer by pressing the appropriate function key 80, the CB-PD Module transmits its Aggregate Customer Desires (ACD) data. If the Vendor would like to re-program the CB-PD Module, the new program (such as a new Customer Design Instrument) is received by the Module 206, 204 and stored in memory 198.

Instrument Design Repository (IDR)

The Instrument Design Repository (IDR) is an automated means to construct Customer Design Instruments (CDI) and program (or re-program) Customer-Based Product Design Modules (CB-PD Modules). The IDR includes one or more stored sets of Customer Probes (CP), one or more Customer Design Instruments (CDI), and utilities for downloading CDIs to CB-PD Modules. Existing Customer Design Instruments (CDI) may be used, modified, combined, re-used, etc. to produce new CDIs. The new Customer Design Instrument (CDI) may then be downloaded into a CB-PD Module or saved for downloading in the future.

FIGS. 8 through 9 inclusive are flow charts which set forth the operation of the Instrument Design Repository (IDR). The IDR allows a Customer Design Instrument (CDI) author to create new CDIs. The new CDIs will then be downloaded or programmed into the CB-PD Module.

As represented in Fig. 8, the Instrument Design Repository (IDR) is organized to have a number of main functions. These include choosing a local set of Customer Probes (CP) 218 or a local Customer Design Instrument (CDI) 218, choosing a remote set of Customer Probes (CP) 228 or a remote Customer Design Instrument (CDI) 224 (i.e., which are located on a remote computer system), choosing the triggers 232 for initiating Development Interactions (DI) with Customers, choosing downloading utilities 238 to program CB-PD Modules, or exiting 244 the IDR.

If the user chooses a local 218 or a remote 224 set of Customer Probes (CP), or a local 218 or a remote 228 Customer Design Instrument (CDI) is chosen, the choice made is confirmed with the user 220, 228 by displaying its descriptive data and giving the user the opportunity to change that data, if appropriate. If the connection is with a remote computer system 226, then the user's choice is downloaded to the user's system 230 before proceeding.

Turning now to Fig. 9, after the user selects a set of Customer Probes (CP) or a Customer Design Instrument (CDI), the user may choose the view 252. The list of available views is displayed 254. These may include areas such as:

.Multiple views open at once, including two or more sets of Customer Probes (CP) and/or Customer Design Instruments (CDI), so the user could access additional sources of probes while working,

.Individual Customer Design Instruments (CDI), including instruments that have been used previously, those that have been written by an outside professional, those that have been downloaded from remote computer systems, etc.,

.By types of Probes, such as scale, multiple choice, true/false, short answer, etc.

.By product or by product features, such as by a specific product like the facsimile machine 70 in Fig. 3, or by a generalizable product feature such as the print quality of the printed output used in a variety of the Vendor's products 84 in Fig. 3,

.By what the Customer Probes (CP) test for, with groupings for questions on the product's user interface, appeal, utility, effectiveness, efficiency of operation, etc.

Subroutines are included 254 for adding, modifying and deleting views from the available views. To create and display these views, each Customer Probe (CP) may be assigned one or more codes that specifies how it is to be displayed in the respective views. To display by each view, these codes are read and the Customer Probes (CP) are grouped and displayed based on those codes. After the user chooses a view 254 the set of Customer Probes (CP) selected 220, 228 or the Customer Design Instrument (CDI) selected 220, 228 is displayed from the user's viewpoint 256.

The user may then choose a function 258 from the available functions 260. These may include operations like:

.Write Customer Probes,
.Edit Customer Probes,
.Delete Customer Probes,
.Reorder the Probes,
.Print Customer Probes (or the Customer Design Instrument),
.Change descriptive information for the set of Customer Probes (or the Customer Design Instrument),
.Merge two or more sets of Customer Probes (and/or Customer Design Instruments),
.Switch to another set of Customer Probes (or another Customer Design Instrument),
.Change language (for developing Customer Probes and Customer Design Instruments to fit other nations and cultures),
.Return to main menu, etc.

For each function chosen, display the appropriate sub-choices 262. For example, for Writing, Editing and Deleting Customer Probes, some of the choices may include:

.Multiple choice Probes,
.Scale Probes,
.True/False Probes,
.Checklist Probes,
.Short answer Probes,
.Essay answer Probes,
.Matching Probes, etc.

When performing an operation 264 each entry screen provides an appropriate format for that type of probe to be entered, a preferred reply to be entered (if it will be needed during later analysis of replies), and codes for displaying the Probe from various viewpoints. After opening the desired set of Customer Probes (CP) or Customer Design Instrument (CDI), the user can delete inappropriate probes, add new ones, or modify existing ones. Next, the user could move the probes into the order desired.

As another example, for printing or saving a Customer Design Instrument (CDI), some of the operations 264 may include:

.Select Probes,

.Save Customer Design Instrument with just Selected Probes,

.Save Customer Design Instrument with all Probes (archive), etc.

When the file is saved, the Customer Design Instruments (CDI) are linked with the appropriate trigger points to display them and record the Customers' answers. If specific Customer Probes (CP) must be asked individually at specific trigger points, these are linked at this time as well.

At any time, the user may end the current operation 264 and switch 268 to another function 216, 224, 232, 238, 244, 252, 258 or operation 262, 264. If the user wants to switch to another file or function 268, the user is offered the option to save the area being worked on 270.

If triggers 232 in Fig. 8 are chosen, a list of available triggers is displayed 234. These may include a variety of triggers some of which will be described below, but examples include:

.Vendor Initiated Interactions (VII) (at product installation, at Nth use of the product, changes in the rate of use of the product, etc.),

.Customer Initiated Interactions (CII) (interactive evaluations and suggestions, electronic suggestion pad, help button, etc.), and

.Passive Interactions (PI) (diary logs, passive evaluation of comprehension, etc.).

As each trigger is selected 234, the appropriate Customer Design Instrument (CDI) is specified to run at that trigger; this provides for the specific appropriate Development Interaction (DI) to take place at each trigger. For example, the Vendor may want Customers to help improve the installation method after the first time they use it, and this would involve a completely different Customer Design Instrument (CDI) than a Customer Initiated Interaction (CII) that provides Problem Reports (PR) by means of the Help button.

As another example, a Vendor may want sub-triggers within a single Development Interaction (DI), such as a probe about intentions when the product's use begins, several probes when major product functions are operated, and a final probe about satisfaction when the product's use ends; these could be specified by means of sub-triggers that would be specified either when triggers are specified 234 or when probes are edited 264.

These customized probes may be displayed at the correct points by using clear Instrument Design Repository (IDR) standards that separate them into pre-use, on-task, and post-use categories. This automatically specifies the first and third categories

while having to attach only the on-task questions to varying trigger points. Since this reduces the custom programming needs significantly, it is possible to automatically include the triggers for a group pre-use probes, and a group of post-use probes, in virtually every Customer Design Instrument (CDI) as standard sub-routines. The interactive, on-task questions would be displayed by their own standard sub-routine (such as "display probe 14") at the correct time during product use. Such a time might be specified by the Customer's pressing a particular function key, by the clock/calendar circuit (10 minutes after starting product use), or by other means.

Subroutines are included 234 for adding, modifying and deleting triggers from the list of available triggers. After the user has selected the triggers to include in the specific CB-PD Module being programmed, this list is confirmed 236.

If download utilities 238 are chosen, the list of available downloading options is displayed 240. Some of the possible options include:

.Initial programming of the CB-PD Module: One of these options 240 provides the means to program CB-PD Modules 243 by means of a Customer Data Reader/Programmer (CDRP) 92 in Fig. 4, by means of a direct link with the Vendor's computer if the CB-PD Module is built into a Customer Directed Product (CDP) such as the facsimile machine 70 in Fig. 3, or by other means.

.Re-programming a CB-PD Module: Another of these options 240 provides the means to re-program CB-PD Modules 243 after they have connected with the Vendor's computer

and uploaded their Aggregate Customer Desires (ACD) data. This provides the automated ability to update the Customer Design Instruments (CDI) and triggers in specific sets of CB-PD Modules, whether they are located locally or remotely, by means of a Customer Data Reader/Programmer (CDRP) 92 in Fig. 4, by means of a direct link with the Vendor's computer if the CB-PD Module is built into a Customer Directed Product (CDP) such as the facsimile machine 70 in Fig. 3, or by other means.

.Set up passive probes 240 such as diary logs, passive evaluations of comprehension, etc. (see below).

With all the possible downloading options, the Vendor may encrypt the CDI file(s) 242. This would prevent competitors or interested hackers from accessing, modifying, deleting, or otherwise tampering with these files in the CB-PD Modules.

Related options are also possible, such as "Export to file." This option 240 would provide the means to save this as a downloadable file, so that its downloading, by means of the other downloading options, may be performed or scheduled at another time.

Such an Instrument Design Repository (IDR) may give Vendors the ability to construct Customer Design Instruments (CDI) reasonably quickly, easily and cost effectively based on numerous advantages. For instance, it would provide an online database of unbiased and objectively worded Customer Probes (CP) that could be added to or used to replace questions in pre-written Customer Design Instruments (CDI). This enables a CDI o

be modified rapidly to meet unique needs simply by adding or deleting specific Probes and noting the specific points in the Development Interaction (DI) which the new Probe would be made. In somewhat greater detail, these functions include:

.It may provide local and/or remote access to pre-constructed Customer Probes (CP) that have been developed and used professionally and are appropriate for immediate use. This provides fast-turnaround for accessing unbiased, non-judgmental probes that help construct valid Customer Design Instruments (CDI).

.It may provide local and/or remote access to pre-constructed Customer Design Instruments (CDI) that have been developed for a specific industry, tested professionally and are appropriate for specific uses. This may provide shorter development times for using or adapting these Instruments for similar uses in the same industries.

.With a common file format for Customer Probes (CP) and Customer Design Instruments (CDI), they could be accessed remotely and copied from one IDR to another. This provides for rapidly spreading professionally developed Customer Probes (CP) and Customer Design Instruments (CDI) from many sources, so that they can be used quickly and productively. In short, focused libraries of Customer Probes (CP) and Customer Design Instruments (CDI) may be created, so that they are readily accessible for

copying and focusing their use on improving the specific products and services of a Vendor. Thus, an IDR system is a general purpose tool for developing and distributing libraries of Customer Probes (CP) and Customer Design Instruments (CDI), as well as a focused tool for its individual users to employ in developing their concentrated understanding of their Customers and relationships with them.

.Remote access enables product design, usability, marketing and other professionals to write, sell or send professionally developed Customer Probes (CP) and Customer Design Instruments (CDI) to clients. These custom probes, developed by outside professionals, could meet unique one-time needs or gather information to meet the specific decision objectives of a Vendor that sells the Customer Designed Product (CDP).

While an Instrument Design Repository (IDR) helps support the standardizing of Customer Probes across a product line or by product features, which enables cross-cutting comparisons, it also supports customizing the Customer Design Instrument to produce unique learning from each product and from each type of trigger 234 when it is used. Standardized probes permit comparisons between products and over time, to identify common strengths, weaknesses and Customer-based suggestions for improvements. By applying similar probes across a product family, the learning generated from one product or market may be generalized to others. Customization

enables unique learning based on each specific product or service, and on one product's evolving set of Customer Design Instruments (CDI) which are modified as that product is iteratively improved over time.

It is technically possible to program this Instrument Design Repository (IDR) in a number of ways. For example, in addition to the programming process described above, another example includes a windowing system in which window 1 (the window numbers are arbitrary) contained the lists of Customer Probes (CP) and Customer Designed Instruments (CDI), window 2 displayed the content of the one selected, window 3 provided communications to access Instrument Design Repositories (IDR) on other computer systems, and window 4 provided the format(s) for writing new custom Probes. The final Customer Designed Instrument could be constructed in a fifth window by clicking on a set of Customer Probes (CP) in window 1 to open it in window 2, then either dragging or copying and pasting the Probes desired from windows 2, 3 and 4 into the final, fifth window. There, they could be cut-and-pasted into the appropriate place and sequence.

Development Interactions

Turning now to the drawing, Fig. 10 illustrates a flow chart of data processing for conducting Development Interactions (DI) by a a Customer Directed Product (CDP) by means of its CB-PD Module.

To characterize Fig. 10 in overview, two means are used to illustrate the performance of a Development Interaction (DI):

Vendor Initiated Interactions (VII) are product Development Interactions (DI) that are triggered at specific events determined by the Vendor. Examples include:

.Installation (triggers may include at the beginning, during or just after product installation; to test components of the steps involved in installation, such as the user interface and any problems encountered),

.Frequency of use (triggers are based on frequency of use, such as during each Nth use of the product; this may be a self-adjusting algorithm that is linked to the clock/calendar circuit, so that it lengthens the time between Vendor Initiated Interactions (VII) if the product is used frequently, and shortens the time between Vendor Initiated Interactions (VII) if the product is only used infrequently, or another approach that may be included and selected by the Vendor), or

.Sudden change in use rate (trigger is based on evaluating the pattern of use by time stamping each use and measuring the actual pattern against a pre-set pattern, or against the pattern during preceding periods; when the actual usage rate speeds up or slows down by more than a set amount or percentage, the CB-PD Module conducts a CDI to inquire about the Customer's reasons for using the product more or less frequently).

Customer Initiated Interactions (CII) are product Development Interactions (DI) that are triggered by the Customer. Examples include:

.Interactive evaluations (a button, function key or other means enables a Customer to initiate a Customer Development Interaction (CDI) whenever desired),

.Electronic Suggestion Pad (ESP) (a button, function key or other means enables the Customer to open an electronic notepad that records and stores Customer suggestions for the Vendor), and

.Help button (this trigger enables the Customer to report problems on-line to a vendor; a variety of uses for a Help button are possible, such as (1) Problem Reports (PR) inform product designers about Customer problems, (2) Help Requests (HR) provide immediate notices to the Vendor's customer service staff about Customer problems, and (3) receiving interactive Help on-line, with a passive report generated that itemizes what Help was needed, so the Vendor gains a clear understanding of the Customer's problems).

Additional types of interactions are possible. Some of the options, which indicate the scope of this invention, include:

Passive Interactions (PI):

.Diary logs (this is a database that is connected to the clock/calendar circuit and may record information such as when the product is used, how long it is used for, the frequency of actual use while it is turned on, which functions of the product are actually used, etc.)

.Passive evaluation of comprehension (this is a database that may record information such as the sequence of keys which produce errors in using the product [by pressing an unworkable sequence of keys or how often a key that aborts or clears a command sequence is pressed], the number of steps actually taken to perform various operations [and whether the Customer used the most efficient method to accomplish that result], etc.)

Customer-based product design: In its broad outline, this invention provides for interactively designing products in ongoing electronic partnerships between Vendors, Distributors and Customers. This includes new abilities to work more closely together by conducting research and improving product design in areas such as:

.Customer demographics and profiles
.On-task interactive product design by Customers
.Active and passive comprehension evaluation of Customer performance
.Electronic participation in work flow and logging of functional steps performed
.Electronic suggestion pad (ESP)
.Post-use Customer Probes
.Determination of the what Customer Help and Support are needed

Design contributions from experts: If a Vendor would like to set up baseline expectations against which Customer responses can be evaluated, a variety of approaches may be used to automate that process. One of these is to have experts use the Customer Directed

Products (CDP) and conduct their own Development Interactions (DI). The data from the experts would be collected and processed as a separate set of Defined Customer Desires (DCD). Once the experts' baseline is established, those views can be compared automatically by computer to the Customers' suggestions.
This can create a set of comparative data that rapidly reveals what the Customers achieved compared to what experts are able to achieve in using the same product: For example, this might help surface the level of product simplicity, Customer support, and other assistance Customers might need to receive the full benefits from the product. Or, if the Vendor had comprehension expectations of what Customers would understand about the product, those could be compared automatically to what the experts understood about the product.

The overall purpose for Development Interactions (DI) is to add to this invention the means for Customers to help improve the products that they use, both systematically and in unique ways. This provides advantages such as:

.Time and dollar savings in the future: By riding the mass manufacturing curves, the cost of building, programming and maintaining CB-PD Modules, so that Customers to help improve a wider range of Customer Directed Products (CDP), can be lowered over time.

.Performance improvements in the future: By riding the learning curve, the abilities of numbers of Vendors and an increasing number of Customers to help improve the products and services they use will increase.

.Generalize Customer-based improvements: Using systematic Customer Probes (CP) and Customer Design Instruments (CDI) enables comparisons between the Defined Customer Desires (DCD) over time (between products, between Vendors, between industries, etc.). When specific problems or opportunities are identified, some of these might be generalized to identify related commercial opportunities, or confirm that related problems have been solved.

With the above overview in mind, attention is now directed to Fig. 10, which is a flow chart of Development Interactions (DI). With the CB-PD Module tracking recognizable events 280 (such as when the Customer Directed Product (CDP) is turned on and off, when a particular product feature is used by pressing a particular button, etc.) the Module determines whether or not a particular event matches a trigger 282. These triggers may be for Vendor Initiated Interactions (VII), Customer Initiated Interactions (CII), Passive Interactions, or any other type of Development Interaction (DI).

Triggers: When a trigger is identified, the CB-PD Module reads the appropriate Customer Design Instrument 284 (decrypting it if needed) and displays the opening menu for it 284 if that is appropriate. The Customer is signaled 284 (if warranted by a particular product) by a ring, tone or other means. The menu 284 should be based on a consistently designed opening screen so it is readily identifiable over multiple Development Interactions (DI). This menu may include an option to

switch the Development Interactions (DI) to another language 286, and once that selection is made the new language chosen is set as a permanent flag 290. This language flag enables properly translated and culturally appropriate Customer Design Instruments (CDI) 260 in Fig. 9 to be run 284. That language flag remains set until a different language is chosen 286 in a future Development Interaction (DI).

Participation not required: Development Interactions (DI) should be non-intrusive; no Customer should be required to participate in this or answer any specific question that they don't want to answer. It is recommended that the user interface should be designed so that in each Development Interaction (DI) a Customer may first decide whether or not to participate 288. If a Customer chooses to not participate, record a "declined to participate" response 287.

Doing the Development Interaction (DI): For each Customer Probe 294 receive the customer's answer 296 by reading the appropriate Customer input device(s) 296 for that Customer Directed Product (CDP). Test for errors 300 (such as whether the input key pressed is within the range of acceptable answer keys). If an error is present display an error message 302 (which message may be specific to that type of error, rather than a general error message) then redisplay the previous Probe 294. If an error is not present, the Customer's answer may optionally be encrypted 304. Then write the answer to a data file 304 and determine if there are any more Customer Probes (CP) in the Customer Design Instrument (CDI) 306. If there are more Probes, display the next probe 294. If a Customer chooses to not answer any particular Probe, enter a standardized "no answer code"

such as "999" as the answer to that Probe 304. If the Customer engaged in this Development Interaction (DI) before and that data file remains in memory 158 in Fig. 6, do not overwrite the previous data file(s). Append a new Development Interaction (DI) to that file or open a new file for this new DI.

Terminating in the middle: In all Development Interactions (DI), the Customer can terminate a session at any point in time 299 (such as a "Quit" or "Clear" button which may be physical or on a display screen; a voice command; a prompt displayed below the probe; etc.). If the Customer exits a Development Interaction (DI) 303, return to 280 and end the trigger condition 282 that caused the Development Interaction (DI) to commence (preventing running this DI as an endless loop).

Types of probes: A wide variety of Customer Probes (CP) are appropriate 294. Some of them include: In a quantitative probe (such as a 1-to-5 scale question or a multiple choice question) it is easy to give quantitative answers 296 and check that for errors 300; the Customer can simply press a number on a numeric keypad 296 and the CB-PD Module can determine if the answer is within a specified range. If there are only a few buttons on a product, a designated button may be pressed once for "1", twice for "2," etc., with a display providing feedback on the number provided.

With a qualitative probe (such as asking why a specified product feature is liked or disliked) Customers may need to provide a text answer. There are various ways to handle this, depending on the features in each Customer Directed Product (CDP). Some of them include:

.Readily available input devices: In products such as the facsimile machine 70

in Fig. 3, voice input 78 may be used. In products that have a alphabet keyboard, such as various types of information industry products, the product's keyboard may be used. In products where the CB-PD Module 62 in Fig. 2 has a full alphabet keyboard 60, that keyboard may be used. .Limited input devices: Products that have only a keypad or a small number of buttons for input may employ a qualitative approach called a "checklist probe." These resemble multiple choice questions in that the Customer simply enters the number(s) of the item(s) in the checklist that corresponds to the qualitative replies they would have otherwise given. Checklist probes must start with separate Customer probes, a set that is developed by manual means before preparing the Customer Design Instrument for the CB-PD Module. This process generates Customer data that may be converted into a checklist of the kinds of responses appropriate for Customers in particular situations, in response to particular probes. The Customers then only need to check off the response(s) that apply to them. Properly conducted, this process is effective for producing both sufficient and valid information. Thus, checklist probes may be written once a manual qualitative study has been completed and enough qualitative (or text) replies have been received to develop an appropriate checklist. While there are several ways

to construct such a checklist probe, one method is to take the qualitative data and divide them into the main categories. Separate them into two lists, one for positive replies, the other for negative. Then rank the lists in descending order from the largest number of Customer replies to the smallest. Finally, compare the two lists side-by-side and make sure that each positive point is matched by a negative one (and vice-versa). This provides the initial checklist with which Customers may reply to that probe by means of a limited input interface.

Since different types of Customer Probes (CP) produce different types of data, the best way to reach a specific decision making objective is to use the types of probes that will produce the type of information needed.

Pre-use probes: Vendors may want to collect some data about the characteristics of their Customers. This falls into broad classes, such as demographic data, competitor intelligence, etc. This data may be collected 294, 296, 304 independent of the use of a Customer Directed Product (CDP), and one of the appropriate times to collect this may be after the product has been turned on but before its use has begun 282. Furthermore, this data may be collected quickly, primarily by means of multiple choice probes 294. This pre-use interaction would acquaint Customers with the presence of the CB-PD Module, its menus and screen design formats 284, and the process of conducting a Development Interaction (DI) with the product 284, 288, 294, 296, 299, 308.

While pre-use probes have many applications, the gathering of demographic data can be used to determine Customer characteristics such as age, gender, educational level, nationality, primary language, etc. As another example, pre-use probes may also be employed to learn the Customer's use of competing products, their purchase plans for certain classes of products, the quantity they intend to purchase, estimated budgets, etc.

Depending on the nature of the Customer Directed Product (CDP), it may be a product that is generally used by one employee or it may often be used by different employees. Thus, for products that are used primarily by one employee, pre-use probes will only need to be run once; for products used by a number of employees, a few key probes may prove valuable in each Development Interaction (DI).

On-task probes: There is an intrinsic bias to an on-task Development Interaction (DI) because it is conducted while a Customer uses a product. This DI leans toward the utility of the features that are being used at that moment. For example, Customers will report more of their specific problems while they are using a product than they would to product researchers even when they finished using it, , and far more than they would a week or a month later.

On-task probes may uncover valuable product design information from any type of use of a product, helping determine what difficulties are present and their severity when they occur. Thus, on-task probes should be used to learn very specific information that is highly valuable to product designers for making improvements; this design partnership helps the Vendor's designers and managers know whether or not the Customers truly understand their products. The primary value is a

clearer and closer relationship with Customers at the time they are using a Customer Directed Product (CDP).

When the Customer reaches certain triggers 282 in using the Customer Directed Product (CDP), the CB-PD Module opens the appropriate Customer Design Instrument (CDI) 284. These may be Vendor Initiated Interactions (VII), Customer Initiated Interactions (CII), or any other form of interaction between the Customer Directed Product (CDP) and the Customer. The Development Interaction (DI) then proceeds as described above.

On-task probes may be triggered 282 by major product features used by all customers, or by minor features that only a minority of Customers will use. When it is desirable to gather data in an area only some Customers will use, such as learning the value of those features to those who do use them, then the use of those features should be the triggers 282 for those on-task probes 294.

The frequency of on-task probes may vary depending on the needs of the product's Vendor and the dynamics of the market for that product. For example, some markets are characterized by "product churning" with frequent introductions of new products. In these cases, both the Vendors and the Customers may want to participate in a more frequent and faster product improvement process, based on a higher frequency of Development Interactions (DI). In other cases, a slower pace may be more appropriate. In addition, the triggers 282 for Vendor Initiated Interactions (VII) may be adjusted within the CB-PD Module by an algorithm that reviews that Customer's willingness to participate 288 in previous Development Interactions, and reduces by some percentage (such as one-fourth or by half) the triggers 282 for conducting Development Interactions (DI).

Active and passive evaluation of comprehension and performance: Since many products must be learned before they can be used well, how long does it take for Customers to learn how to use them? In what sequence are the products actually learned? Do the Customers master the product and become proficient in using it, or merely muddle along? If they only muddle along, when does their learning plateau and what do they fail to learn? These kinds of questions are essential for both Vendors and Customers to answer; being able to gather data that answers them, as this invention could make possible, may produce some of the greatest long-term gains from CB-PD Modules.

If these types of Customer Design Instruments (CDI) 284 are run occasionally, their interactive probes 294 can investigate the Customer's comprehension of the product's features. For an interactive evaluation, ask comprehension and performance probes either during the use of the product 294 or at after certain product features have been used 282. This could include many types of probes that ask the Customer to recite facts, give explanations, cite principles, etc. In general, the Customer could be asked to demonstrate his or her learning from using that product.

Both comprehension and performance may also be evaluated passively, without the Customer's involvement, since many products are used interactively. The CB-PD Module computer can be triggered 282 during a particular use of the product, to record passively 291 the number of Customer responses that fall within acceptable ranges 292, the number outside of those ranges 292, and what specific actions were done outside the range of properly using the product 292. Since the CB-PD Module can calculate the ratio between those two numbers, if that comprehension (or performance) ratio falls below an

expected level for that product, then that could trigger 293 a message to transmit the CB-PD Module's data to the Vendor 312. This transmission could trigger a customer support service by the Vendor's employees, to assist the Customer in improving the use of the product.

In general, for a passive evaluation, specify triggers 282 (such as the Nth use of the product or employing a particular product feature that would demonstrate Customer understanding or the lack of it), track the product input 292 and compare that with pre-specified acceptable use of the product 292; record the appropriate data 292 and any specific sequences of incorrect product uses 292 that the Vendor wants to know.

Electronic suggestion pad: An electronic suggestion pad helps a Vendor learn the unanticipated problems and suggestions Customers may have while using a Customer Directed Product (CDP). While this is not expected to provide as large a quantity of Customer input as probes, its quality may be high. It is a side channel for Customers who have something they want to report or contribute, but haven't been questioned specifically on that point. The electronic suggestion pad is purposefully unstructured and free-form so Customers can describe, in the ways that make the most sense to them, their descriptions of problems and their suggestions for the product.

Since the use of an electronic suggestion pad will be contextual, it is suggested that the trigger 282 be customer initiated. When the Customer enters the appropriate key or command 282, a menu is displayed 284 with the electronic suggestion pad as one choice in it 284. When the Customer selects this choice, a passive probe 291 reads the available product data 292 and writes the available information 292 about the Customer's

current uses of the product and its configuration. The display then opens a free-form entry area 294, reads the Customer input 296 (such as problems, comments, suggestions, etc.) and writes the input as a record 304 to the electronic suggestion pad's data file. After the Customer exits 299 the electronic suggestion pad, a thank you message is displayed 303.

Diary logs: A diary log provides passive tracking of the use of the product by its Customers. Among other types of valuable information, it could:

- .Count the number of times a Customer uses a Customer Directed Product (CDP), so that number can be compared to the number of times such a product is actually expected to be used,
- .Report the Customer's performance and comprehension in using some parts of a Customer Directed Product (CDP),
- .Imply, by the areas where problems are passively identified, where the Customer's future needs will be heavy and where they will be weak,
- .Inform the Vendor's managers which investments in new product features are most likely to be valuable to Customers and which are most likely to not be used,
- .Guide product Vendors toward a clear understanding of their products based on how Customers actually use them, and away from developing products and features that are consistently not used, etc.

These types of data are helpful when a Vendor has designed a product to produce certain benefits for its

Customers, and needs to know if the Customers used those features. A diary log would inform the Vendor of the proportion that actually used, and did not use, each product feature that can be tracked by a CB-PD Module, where such tracking is turned on.

Customer Help: A Help feature in the CB-PD Module enables the Customer to report problems with the product to its vendor. Among others, there are two types of Help requests: (1) Problem Reports (PR) inform product designers and Vendor managers about Customer problems, and (2) Help Requests (HR) may provide immediate notices to the Vendor's customer service staff about Customer problems).

Problem Reports (PR) provide the means for a Vendor to improve the design and performance of their product(s), and the customer satisfaction from using them, by means of:

.A log showing that help was accessed 291 and the use of the product 292 when it was accessed,

.A Customer Design Instrument (CDI) that probes what the Customer's problem is,

.What the Customer would like in the way of help to solve that problem right away,

.How the Customer suggests solving it in the future, etc.

These Problem Reports do not solve Customer problems on the spot, but they do let Customers notify Vendors of the help that they need.

Help Requests, on the other hand, may be more immediate and responsive. If the Customer Directed Product (CDP) has a means of communications (such as the facsimile machine 70 in Fig. 3, the CB-PD Module in 120

Fig. 5, the Customer Data Reader/Programmer (CDRP) 92 in Fig. 4, or some other means) the last function, Help Requests (HR), may be used to replace some types of initial Customer calls into a Vendor's customer service departments. In brief, the Customer issues a Help command 282 (such as by pressing a Help button or a command). A menu is displayed 284 with the Help feature as one choice 284. When the Customer selects this choice, a passive probe 291 reads the available product data 292 and writes the available information 292 about the Customer's current uses of the product and its configuration. A Help Customer Design Instrument then provides the first Customer Probe (CP) 294, reads the Customer input 296 and writes the input as a record 304. After the Customer completes the Help Request (HR) 306 a thank you message is displayed 308. By pressing a "transmit" function 312, perhaps one with an "emergency transmission" code or phone number, this data is immediately sent 336 to the Vendor's computer. There, the emergency transmission code enables the message to be routed 336 to the Vendor's customer support staff via its internal E-mail system. They can be notified of this new Help Request by the E-mail system. There, a customer support employee may use the Help information from this Customer Directed Product (CDP) to research the problem and phone the Customer rapidly, providing support to Customers while they are on-task, using the product. The net result is the Vendor extends their customer service department right into its products, and provides the means for its Customers to obtain on-task support as one of their product's internal features.

Interactive services and transactions: Interactive communications like those described in the Help feature

may be extended to providing other services and to conducting transactions:

.Interactive services: For example, Customers may request a variety of services such as scheduling a product maintenance appointment, requesting that another copy of the product's manual be sent, or asking to have a salesperson contact them about a possible future order.

.Transactions: For example, Customers may conduct transactions such as placing orders for additional products, signing up for an annual service contract on the product, or ordering other products in the Vendor's product line.

If a Customer Directed Product (CDP) has built-in communications (such as the facsimile machine 70 in Fig. 3, the CB-PD Module 120 in Fig. 5, the Customer Data Reader/Programmer (CDRP) in 92 Fig. 4, or some other means) then interactive services and transactions may be provided directly through a Customer Directed Product (CDP). These interactions may be initiated by either the Customer or the Vendor.

In brief, either the Customer or the Vendor initiates the interaction 282. A menu is displayed 284 with the interactive services feature and/or the transaction feature as choices 284. When the Customer selects either of these choices the appropriate Customer Design Instrument (CDI) is read 284 (of which a wide variety may be stored in Memory 158, with access to them by means of further selection such as by a sub-menu). The CB-PD Module then displays the first Customer Probe

(CP) from that interaction 294, reads the Customer input 296 and writes the input as a record 304. After the Customer completes the interaction 306 a thank you message is displayed 308. By pressing a "transmit" function 312, perhaps one with a "special transmission" code or phone number, this data is immediately sent 336 to the Vendor's computer. There, the special transmission code enables the message to be routed 336 to the Vendor's customer support staff via its internal E-mail system. They can be notified of this new Help Request by the E-mail system. There, the appropriate Vendor employee may use the information from this Customer Directed Product (CDP) to respond appropriately and rapidly to their Customer's requests. The net result is the Vendor extends their ability to provide services and sales to their Customers right into its products, and provides the means for its Customers to obtain services and to conduct transactions as one of their product's internal features.

Intelligence probes: Intelligence probes provide a flexible tool that may add significant value to the CB-PD Module. These may be used either as a component of a Customer Directed Product (CDP) or separate from it. Intelligence probes can help assess the ongoing value of the product to the Customer, the Customer's opinions of competing products, and that Customer's specific needs for products in this category in the future. This type of Customer relationship may help determine the success of the Vendor in the marketplace, especially with Customers who have already bought its products, and with Customers who are using "demonstration units" to test the Vendor's products.

Most of the time, when intelligence probes are employed in conjunction with the use of the product, these would

be triggered 282 as pre-use or post-use Development Interactions (DI) 284; they would generally not be on-task probes. For example, intelligence probes 294 given at the start of the use of a product 282 might help determine what the Customers like about this product 294, what they like most about competing products 294, and what might be improved in this product (in the Vendor's prices, support policies, etc.) to keep their company from purchasing competing products 294.

Multi-direction communications: Once a CB-PD Module is built into a product and has one or more means to communicate with both the Customer and a Vendor, it may also form a communications link between the Customer and others. These links may be Customer initiated or they may be initiated by the third parties. With those communications links, many additional functions may be added, such as any of the above functions provided for other third parties in addition to the product's vendor, the CB-PD Module serving as a communications medium for third parties (for contacts such as providing third-party product support services, conducting market research, delivering marketing pitches, consummating sales transactions, etc.), etc.

If a Customer Directed Product (CDP) has built-in communications (such as the facsimile machine 70 in Fig. 3, the CB-PD Module 120 in Fig. 5, the Customer Data Reader/Programmer (CDRP) in 92 Fig. 4, or some other means) then multi-party communications may be provided through a Customer Directed Product (CDP).

In brief, either the Customer will initiate the interaction 282 or it will be initiated by a third-party; the latter will occur more in Customer Directed Products (CDP) whose design includes two-way communications such as the facsimile machine 70 in Fig. 3. When the Customer

initiates it a menu is displayed 284 with the communications feature as a choice 284. When the Customer selects that choice the appropriate communications-oriented Customer Design Instrument (CDI) is read 284 (of which a wide variety from independent third parties may be stored in Memory 158, with access to this variety by means of further selection such as by sub-menus). The CB-PD Module then displays the first Customer Probe (CP) for a communications interaction 294, reads the Customer input 296 and writes the input as a record 304. After the Customer completes the interaction 306 a thank you message is displayed 308. By pressing a "transmit" function 312, perhaps one with a "special transmission" code or phone number, this data is immediately sent 336 to the third party's computer. There, the special transmission code enables the message to be routed 336 to the appropriate employee via its internal E-mail system. The employee could also be notified of this communications by the third party's computer. There, that employee may use the information from this Customer's communication to respond appropriately.

At the time the Customer's computer connects to the third-party computer 360 in Fig. 12, the third-party's computer may download 384, 386 additional Customer Design Interactions (CDI) to the CB-PD Module. With multi-direction communications, these may be employed in the future as Vendor Initiated Interactions (VII) or Customer Initiated Interactions (CII) for any of the purposes that are possible with this invention. The net result is that both the Customer and third-parties extend their ability to provide networked relationships right into the products that Customers buy and use, and provides the means for its Customers to obtain support,

services and products as one of the normal features of these Customer Directed Products (CDP).

Summary: A Customer Design System Fig. 1 may be a new way of viewing the relationships and market mechanisms that connect Vendors who sell products and Customers who buy and use them. This invention is potentially a complete system that includes explicit apparatuses and methods to bring Vendors, Distributors and Customers into a new type of design and performance partnership.

This Customer Design System (CDS) invention may be viewed as a new medium through which Customers can develop and describe their conception of how each Customer Directed Product (CDP) could better satisfy their needs. They make their contributions when their conclusions from using (or testing) a product are transmitted back to the Vendors, and incorporated into the product to improve it and make it more applicable to the Customers' purposes. With this invention incorporated into certain products, if Customers find those products to be wanting in certain important respects, they can do something about it. They can individually help improve it. Thus, product design and improvement becomes less of a private activity carried out primarily by Vendors. Product design and development is thrust into the Customer's domain. The Customers gain new abilities that may prove enormously valuable to them, which is the ability to shape the design and quality of the products that they use:

<u>Transmission and Security Procedures</u>

Turning to Fig. 11, transmission takes place by means already described. Once there are one or more Aggregate Customer Desires (ACD) data files in memory 320, when an appropriate time occurs to transmit this data to the Vendor 293, 312 the Customer takes the

appropriate step for the particular configuration of the CB-PD Module in a Customer Directed Product (CDP). Some examples of the configurations possible include the facsimile machine 70 in Fig. 3, the CB-PD Module 120 in Fig. 5 and the Customer Data Reader/Programmer (CDRP) 92 in Fig. 4.

If the Customer will transmit directly to the Vendor 328, the transmission may be as simple as pressing a "send" function key. The CB-PD Module may contain all necessary phone numbers and procedures for a fully automated process 332 of sending the data to the Vendor's computer. Or, if the Customer needs to take certain steps, those are displayed 330 so the Customer may follow them (such as removing the CB-PD Module from the product and plugging it into a phone line 126 in Fig. 5)

If the Customer will connect the CB-PD Module to a Customer Data Reader/Programmer (CDRP) 328 and 104 in Fig. 4, those instructions are displayed 324 and the data is transmitted to the Vendor's computer 326.

If the Customer does not want to transmit the Aggregate Customer Desires (ACD) data to the Vendor when requested 334, then these data files are simply retained 320 in the CB-PD Module's memory 158 in Fig. 6 until they are transmitted.

Optionally, the stored Aggregate Customer Desires (ACD) data may be encrypted. This protects it from theft, tampering, or other types of interference or damage. For example, if a standardized CB-PD Module were added to a variety of electronic products, it could become routine for a third-party service and repair business to remove them from those products 322, 324, insert them into a Customer Data Reader/Programmer (CDRP) and press a function key to transmit the data to the appropriate Vendor 326 (and the Vendor's computer would update the CB-PD Module while it was on-line). For

another example, if multi-direction communications are possible with a CB-PD Module, then multiple third-parties may be able to establish communications links with the CB-PD Module. In those and in other types of situations, it may be desirable to encrypt the Aggregate Customer Desires (ACD) data, to prevent the CB-PD Modules from being read and their data sold to competitors.

With an encrypted data file 320, it would pass through the Customer Data Reader/Programmer (CDRP) in its encrypted format 326, or be transmitted directly to the Vendor's computer in its encrypted format 332. In neither case would there be any external access to a decrypted data file, or to the security keys or security procedures that would decrypt a data file. The ability to decrypt the Aggregate Customer Data (ACD) 338 would be retained entirely inside the Vendor's computer, and internal security procedures (such as those in 340 - 356 inclusive) could be used to protect access there, as well.

Overall functionality: The flow charts in FIGS. 10 and 11 do not describe all steps and all options since those skilled in the relevant art can readily understand the method used for developing an apparatus and methods to place into products the ability for Vendors to interact directly with Customers, perform quantitative and qualitative inquiries, providing interactive services and transactions, and to conduct the other activities that may be possible for a Customer Directed Product. An understanding of the functionality of the overall Customer-Vendor partnership that may be developed by means of this invention can be obtained from the following sample of the following types of activities, providing Customers with new means to direct the design and evolution of their products:

(a) Inquiry Functions: How is usage going, what is the usage pattern, how does the customer evaluate the product and the Vendor's related services or support, etc.

(b) Reporting Function: What happened, what went wrong (or right), why that occurred, etc.

(c) Suggestion Function: What Customers would prefer, how they would design it, what would avoid the problem(s), what would meet their needs better, etc.

(d) Help Function: What type(s) of help they want, how the Vendor might provide it to them, what their needs are for Help at that moment so they can be met rapidly by the Vendor, etc.

(e) Interactive Services Function: What types of information and services could be built into the CB-PD Module, what problems it could direct them to avoid, what problems could be corrected, what specific advantages they might gain from that information, what specific accomplishments they might make with that information, "what if" opportunities for simulations in using the product in certain ways ("try before using"), training exercises that might be included in the CB-PD Module, services that can be delivered by the Vendor, schedule activities with Vendor employees, etc.

(f) Transaction Function: Requests to purchase more of that product, request to purchase other products from that Vendor, schedule the location of delivery,

schedule the date and time of delivery, request the purchase of one or more services from the Vendor (such as purchasing maintenance contracts, support services and ancillary services), etc.

(g) Broader Communications Functions: Once a CB-PD Module is built into a product and has the capacity to communicate with both the Customer and with a Vendor, it may also form a communications link between the Customer and others. With those communications links, many additional functions may be added, such as any of the above functions provided for other third parties in addition to the product's vendor, etc.

These are merely examples of the types of Development Interactions (DI) which can be conducted by means of the CB-PD Module, and are not intended to be exhaustive.

Customer-Based Product Design Reports (CD-PDR)

Customer-Based Product Design Reporting (CB-PDR) is an automated, structured system that analyzes and presents the Defined Customer Desires (DCD). This system is illustrated in FIGS. 12 and 13 inclusive. The system includes one or more computers at the Vendor 118 in Fig. 4 having an input via telephone 116 or other means for receiving Aggregate Customer Desires (ACD) data 378. A procedure is used to determine that this communications is valid and satisfies the operative criteria regarding CB-PD Module identification, product identification, Customer Design Instrument (CDI) identification, etc.

In one such means for determining that this is a valid communication, the transmission of incoming ACD

data 360, 378 are first validated by examining the CB-PD Module's ID 362, 364, 366, 368 to assure that this is an authentic CB-PD Module. If not, a message is sent to the transmitting means 368 (such as a Customer Data Reader/Programmer or a CB-PD Module) and an error record is written 368 in a file in the Vendor's computer. The specific Customer Data Instrument (CDI) is then validated by examining its ID 370, 372, 374, 376 to assure that this is an authentic CDI. If not, a message is sent to the transmitting means 368 and an error record is written 368 in a file in the Vendor's computer.

After validation 362 - 376 inclusive, the Aggregate Customer Data File (ACD) is transmitted 378 and appended or merged into the Vendor's Aggregate Customer Data (ACD) database 380. If there is another data file in the CB-PD Module 382, its Customer Design Instrument (CDI) ID is validated as described above 370 - 376 inclusive. If the CDI is valid the data file is transmitted 378. If there are not any more data files to transmit, the CB-PD Module is updated 384, 386. The updating 386 may include downloading actions described above 238, 240, 242, 243 in Fig. 8 and deleting from the CB-PD Module's memory the data files transmitted to the Vendor's computer 386. It may also include other functions such as reading the CB-PD Module's clock/calendar and re-setting it if it is not correct. After the CB-PD Module is updated, a thank you message is displayed for the Customer 388 and the communications link is terminated 388.

When entered in the Vendor's computer(s) 116 in Fig. 4, the Aggregate Customer Desires (ACD) data is stored as part of one or more ACD databases in a format that allows the particular data from each particular Customer Design Instrument (CDI) to be addressed and extracted to produce its own Customer-Based Product

Design Report (CB-PDR); and by a format that allows the data from user-selected groups of Customer Design Instruments (CDI) to be collected and merged to produce integrated Customer-Based Product Design Reports (CB-PDR) that report the data from the same Customer Probes (CP) used in different Customer Design Instruments (CDI). This permits the analysis and reporting of Customer data by product, by common product features across a product line, etc.

A variety of methods of maintaining a database(s) and reporting from it (them) are well known. Here, three options are illustrated in Fig. 13, with the first two being Employee Initiated Reports (EIR) and the last being System Initiated Reports (SIR). The first is to choose a pre-written report 402. If an employee chooses to run a pre-written report 402 a menu of available reports is displayed 404. When the employee selects a report 404 there is an opportunity to accept its defaults or to change its parameters 404. One range of selection parameters may focus on the type of data to be included in the report, such as the specific Customer Directed Product (CDP), Customer Design Instrument (CDI), product feature(s), groups of any of these, etc. Another range of selection parameters may limit or focus the data selected in the first range, such as the time period covered in the report, the countries or region of the world covered, the source languages in which the data was reported, etc. After the appropriate parameters are entered 404 the report is run 406 and the finished report is displayed on the employee's screen or printed 406 as the employee chooses.

If an employee chooses to create a custom or a new report 408 the database's report generator is run 410. If there are a number of report generators on the system, however, the employee may be presented with a menu of

available choices 410. Once a report generator has been selected, the employee develops and tests the report 410. After the report is developed and tested 410 the report is saved 412 to the menu of available reports 404 or to the automated triggers 414 that run pre-written reports automatically.

In addition, automated triggers may be set up to run and deliver System Initiated Reports (SIR) automatically 414. In this case, when a trigger (such as a date, time, number of records in the Aggregate Customer Desires (ACD) database, etc.) 414 is reached, the report appropriate for that trigger is read 416 (such as for a particular Customer Directed Product (CDP) or other report parameters as described above) and the report is run 416. After the report is run 418 it is automatically sent on-line to a pre-set delivery list 418 (such as via E-mail or other delivery means), or it is printed automatically for physical delivery to a delivery list 418. These delivery lists may be internal to a single location such as a corporate headquarters, it may be multi-location such as to appropriate managers throughout a multi-national corporation, it may include third-parties such as OEM or components suppliers who participate in designing future product improvements, etc.

To lower costs systematically, it is helpful to automate as much of the calculation and reporting of the Customer-Based Product Design Reports (CB-PDR) as possible. If a standard data file format is used, various types of pre-written or automated reports may be run (using either pre-packaged report generators or custom reporting software). Automating this reporting system lowers the cost, accelerates the turnaround and may provide on-demand reporting of Defined Customer Desires (DCD) in real-time from this Customer Design

System (CDS). For example, commercial statistical software may be used if all the data are numeric (which may mean converting Yes/No answers to a format like Yes=1, No=2 and No Answer=3; converting 1-5 scale questions to 1=1 through 5=5 with No Answer=6, etc.) The only exception is for Customer text responses which should be stored in text fields in the database.

Similarly, it will help lower costs and raise the comprehension by recipients if the format for presenting the Defined Customer Desires (DCD) is automated and standardized. While many formats are possible, a reporting format has been designed for rapid reading and comprehension. Turning to the illustration in Fig. 14, this format includes the number and name of the probe 430 and the precise wording of that probe 432. A quantitative section provides the Customer responses in the most comprehensible numeric formats, including the choices the Customers could select for their answer 434 (including "no answer" as a reply), the percentage of the Customers who replied with each choice 436 and the exact number of Customers who replied with each choice 438. A graphic section provides a graph of the Customer replies 440 that includes a percentage or numerical scale appropriate for the replies 442, a clear and simple graphic display of the Customer replies 444 and clear labels 446 that match the choices reported in the numeric section 434. A text section provides the Customer's text replies 448, including the precise wording of the probe which produced those replies 450. The Customer replies 452 should be sorted and segregated to fit the choices in the numeric section 434 and the graph labels in the graph section 446 so that the reader can understand the problems and concerns of each group of Customer responses 452. This ranking should include the text comments from

Customers who did not respond to any other portion(s) of the probe 454.

With such a format for a Customer-Based Product Design Report (CB-PDR), the quantitative findings 436, 438, 440 are automatically totaled and presented in a format whose meaning is easily understood. The qualitative findings 448 are sorted and presented to match each graph and numerical table so detailed Customer-based insights are presented to explain every conclusion. These Customer-based reports can alter the views of product designers, product managers, marketing executives, senior managers and others. In a few minutes on a regular basis (such as each month; faster or slower cycle times are possible, depending on the need for this information) they can gain a vital new perspective: the view through the eyes of their Customers, while they were using their products.

This format provides each reader with the means to read this report quickly in their own cognitive style. Pictorial readers (such as many designers) can scan graphs 440, quantitative readers (such as many financial managers) may use percentages 436 and/or raw numbers 438, while rational readers (such as some general managers) may skim Customer comments 448 in the problem areas. The specific Customer comments 452 help improve the products, and may offer suggestions for what Customers need, such as "Too many numbers to manipulate." Each reader also has the other forms of data 436, 438, 440, 452 immediately available to help answer questions. Thus, a Customer-Based Product Design Report (CB-PDR) in this format may be read very quickly but still yield a great deal of understanding, regardless of the reader's cognitive preferences.

In automating this format, some additional points may help:

.When running a series of Customer Design Instruments (CDI) over time, the earlier sets of Defined Customer Desires (DCD) may produce certain types of baselines against which to evaluate later findings. This may help determine whether the Customers' desired improvements have been achieved, or whether previously noted problems remain. It is generally possible to automate the identification of positive or negative changes in Customer attitudes, particularly when it is done by comparing quantitative responses to the same probe longitudinally (i.e., over time). This may be done by means of exception reports, custom reports that focus on specific customer-reported problems, etc.

.There are exceptions to this format, such as when a probe has only two choices 434 (such as a yes/no or a true/false question) so that the graph 440 may be eliminated.

.When percentages 436 are calculated, they should be based on the total number of Customers that responded to the Customer Design Instrument (CDI), including those that did not answer that particular probe. For example, in Fig. 14 a total of 3,513 Customers responded, but that number included 191 that did not answer probe #12 430. If all percentages reported 436 are based on that total number (3,513 in Fig. 14) and the number and percentage of participants who did not answer each question is also reported, the reader

gains a clear and unambiguous idea of the number and percentage of respondents who answered each question in each way. .When a checklist probe is reported, the percentage 436 and number 438 of replies should be placed next to each item in the checklist, and the checklist should be sorted and printed in descending order.

For reporting passive probes 291, 292 in Fig. 10, an automated analysis of the CB-PD Module's diary log may utilize forms like:

Method 1 -- a table: Employ a matrix table in which each row is a product feature and each column is a particular type of use of that feature; then each row and column intersection becomes a counter. Each time a Customer uses a particular product feature in a particular way, increment that counter by one. For display or reporting, sort this table with the most used product feature in the top row (this sort may be by the number of times each product feature was used or by the percentage of Customers who used that product feature, whichever is most meaningful for each particular product). In addition to the counter in each row and column intersection, additional information may be reported in that space (for example, the number or percentage of Customers who accessed that product feature and used it in that particular way, the total number of minutes it was used or [by dividing it by the number of times it was used] the average number of minutes it was used in each time it was used). If the software and printer can automate each box's shading, the individual intersection boxes may be shaded from dark to light, depending on the frequency of use, total number of uses, etc. To integrate such a diary log display with Defined

Customer Data (DCD) from Development Interactions (DI), the shading of the individual boxes could be based on Customer satisfaction/dissatisfaction data, or some other measure that will help graphically display the Customer's views of each feature of that product.

Method 2 -- a graph: A variety of options are possible. One approach is a bar graph with the bars extending to the right. The data should be sorted so the most used feature is the top bar (sorted by some clear measure such as the number of times that product feature was used, or by the percentage of Customers who used that feature, whichever is most meaningful for that product) and the product's features are displayed in descending order. The left axis could list the name of each product feature (or each major area or type of service, if this graph illustrates a service). The top horizontal axis could be the number or percentage of Customers, while the bottom horizontal axis could be the number or percentage of times the product feature was used, the number of minutes it was used or the average number of minutes per use, etc. The graph's bars extend to the right, with two bars per product feature (the top bar contains the data for the top horizontal axis, such as the percentage of Customers who use this product feature, while the bottom bar contains the data for the bottom horizontal axis, such as the average number of minutes per use).

When any of such methods are used to display data from passive probes (i.e., a table or a graph), if any related data is reported with it, the related data should be sorted and reported in the same order as the data in the table or the graph.

Such a Customer-Based Product Design Report (CB-PDR) system may automate the reporting of Defined Customer Desires (DCD) that reflect the valuable, real-world views of a Vendor's Customers. This reporting

system is one of the components of this invention which assist in consolidating, presenting and clarifying the Customers' needs and requests for improvements in products and services for managers, product designers and other relevant employees, distributors, consultants, suppliers, etc. Some of the resulting advantages include helping the recipients of these Customer-Based Product Design Reports (CB-PDR) improve management results such as:

.Using rapid Customer feedback to continuously accelerate (1) the identification of the potentially most valuable product improvements and (2) fixing the most pressing problems, to overcome delays in product improvement competition, while producing more valuable improvements and product quality than competitors can achieve,

.Reducing the cost of the combination of in-depth customer understanding and close relationships with customers, and minimizing operating costs by setting budget priorities based on what Customers would like to receive (which eliminates unnecessary expenses),

.Transferring clearly Defined Customer Desires (DCD) between product designers, by identifying specific problems and improvement opportunities for specific products and transmitting that immediately by computer to designers and mangers of different but related products and services,

.Improving the management of multiple product designers and the resulting

product lines, since products and services can be understood both individually and in categories, so that a clear management overview may be developed of actual performance in the marketplace -- from the Customer's point of view,

In the future, the Customer-Based Product Design Reports (CB-PDR) may help lead to continuous improvements in performance such as:

.Assisting in extending what Customers prize most into entirely new products and into brand extensions of current products,

.Developing and supporting a unified corporate culture of superb performance through a focused process of Customer responsiveness and product quality (even if individual products are created and marketed by independent teams, separate business units, etc.),

.Within a generation or so, making it routine for certain classes of products to include this invention's idea, a two-way communications network for continual Customer direction, as a normal feature of these products, to involve Customers in an evolving partnership with Vendors. While this is a new invention today, at some time such two-way partnerships may become a normal expectation of Customers.

Summary of the Invention

What results are produced?

Once developed and integrated into a product, an automated Customer-Based Product Design Module (CB-PD Module) adds new and fundamentally different

opportunities to obtain continuous Customer information in potentially faster, cheaper and more systematic ways than expensive and occasional market research. Since management decisions must inevitably be made about all aspects of products and services, Customers can and should participate in these selections. The CB-PD Module produces usage-based information on several levels:

.There are product design decisions, such as which product features should be added or improved to add the most value to that product.

.There are product management decisions, such as learning why specific products are preferred by Customers.

.There are Vendor management decisions, such as using Customer views of different product categories to help allocate corporate resources so that the business can jump faster and farther toward its revenue and profit objectives.

.There are business performance decisions, such as providing a continuous flow of current Customer-Based Product Design Reports (CB-PDR) into the Vendor's internal data networks so many areas of the organization can develop iterative improvements in their operations, performance and results.

Today, every corporation confronts multiple investment opportunities, limited resources and competitive thrusts from world-class corporations. The best decisions possible must be made and coordinated by product designers, product mangers, senior executives and functional managers. The quality and accuracy of these decisions determine numerous types of competitive positioning and success. How can the employees, throughout a corporation, continually identify the best available opportunities for leveraging their current resources to produce the largest gains?

This invention proposes a CB-PD Module, with a Customer Design System (CDS) as an added, built-in feature of appropriate products and services for direct customer-based connections that may assist a variety of Vendor employees with high-quality, current information: analyzed and Defined Customer Desires (DCD) as an on-line part of their decision making environment.

This produces continuous learning opportunities for Customer-based iterative and radical improvements in products and services. With this new linkage, this invention may help compress the cycle of setting objectives, producing accurate designs, improving performance, and reaching targeted objectives -- whether the goals are to produce more sales, to gain new market share, to improve internal operating performance -- or to deliver the highest quality, most desired products and services available anywhere.

What might happen to the business environment and the economy?

This invention's result might become more than just a new product feature. Over time, this may produce a new type of economic planning and decision making environment that includes automated systems for continuous learning and improvement, based on an interactive partnership between Customers, product designers, service designers, and Vendors. For example, if product designers and managers prepare for decision making meetings using this invention's Customer-Based Product Design Reports (CB-PDR), they would enter these meetings with a quantitative and qualitative understanding of how well that product is actually working in the marketplace during the current period, and the parts of the product's design and performance that need to be improved. Such well-informed meetings,

instead of being rare, could become more frequent and perhaps even a normal expectation in some businesses.

Automated Customer-Based Product Design Reports (CB-PDR), as close as the computer screen at one's elbow, would help compress the innovation cycle by producing Customer-based direction for continuous increases in both customer satisfaction and sales. The result could be the development of a direct partnership between Customers and Vendors to engage them, as a cooperative community, in creating the improvements that they want -- faster and sooner -- as a normal part of product use.

A generation from now, it may be taken for granted that many types of products and services should include an ongoing product feature for continual Customer involvement, to offer Customers the chance to solve product problems and rapidly improve the design and performance of the products and services that they buy.

Today, this new insight is being developed as a systematic technology to help Vendors identify the best available opportunities for investing in new products and product features, in marketing and in support systems -- to make their products, services and their companies the most successful ones in the world.

<u>The idea of a Customer-Based Economy (CBE)</u>

This CB-PD Module may produce products and services that can be closely and continuously linked to the needs and values of their Customers. The resulting Customer Directed Products (CPD) become the joint creations of Customers and Vendors. New preferences, product features, and Customer capabilities could be developed by this partnership.

The fact is, each product exists within the context or frame of reference in which it is used, so that its Customers ultimately make sense of its features and capabilities and either value or do not want the

benefits claimed by the product's Vendor. Inevitably, therefore, every product design is biased. For that bias to work for the Customer, there must be design selectivity and judgment that includes the Customer's viewpoint. The approach embodied here is that one effective way to include the Customer's judgment is to enable his or her participation in making these choices by means of a physical networking module that may be embedded into appropriate products and services.

Today, an increasing number of products and media are being merged and delivered by two-way networks. The coming installation of optical fiber networks to businesses and to the home will produce an enormous expansion in the products and services that may be marketed and delivered over networks. In this context, the emergence of networked societies, this invention is more than just a reflection of the financial needs of Vendors to increase revenues and profits. It can also be seen as a reflection of what may become some of the beliefs, assumptions, and values of such a networked society.

The fundamental change is for Customers to assist in providing a conscious gatekeeping function; they help choose the nature of the products and services they prefer and the features they want included or excluded. Thus, the transition is to interactive products that are actively shaped by the needs, demands and constraints of the people and organizations that use them.

The eventual result could be that products and services are manufactured based on active preferences, beliefs and values that emerge (at least in part) from the people who buy and use them, as a normal feature of product use.

This reflects the inventor's belief that Customers do not have to be as passive as they are today. Customers may do more than select the products they buy; they could help design them to fit their interests, goals, and beliefs. In such an environment, vendors would find it harder to throw at the market products that are based on features and capabilities that do not interest Customers or that they do not want. Customers would interact with an increasing range of products and services throughout their life cycles (perhaps even from the earliest idea stages), to help evolve them toward the features they want and will use. And if a product has been bought that is too difficult, too confusing, or offers something that Customers do not want, Customers could become very accustomed to hitting the interactive "Help button" and switching on a way to tell the Vendor immediately that there is a problem, perhaps how to fix it, or to request a specific service -- like immediate assistance or even a refund.

Most often, though, Customers will employ only those portions of a product to which they are going to pay attention and they will interpret it in the manner they choose. For the first time, Vendors will be able to understand what is really going on with their products and why: Customers may or may not think the same features are valuable that the Vendor believes; they may not use the product for the purposes the Vendor intended or they may apply it in entirely new ways that are unsuspected and unknown to the Vendor. Thus, the most likely outcome is to continuously educate Vendors to the current and changing real needs and interests of their Customers. Since this invention provides private information only to those Vendors who include this module in their products, this is strategic information that may

be translated directly into improved products, revenues and profits.

In the end, an underlying belief drives this invention. The expectations and values of a networked society may not be the same as those we have today. To consider the potential impact of this invention, and extend the range of intellectual property that it covers, inevitably includes currently unknown ways that this invention might be employed in the future. To pursue this line of development, however, extends this invention directly into three stages of perception, growth and use of this invention by Customers and Vendors:

Stage 1: Comprehension -- What is it?

Stage 2: Mirroring -- Who are we, really, and what can we accomplish with this knowledge?

Stage 3: Mastery -- Is this invention part of a larger quest for market efficiency, societal prosperity and human perfection?

Stage 1: Comprehension

What is each product (that has a CB-PD Module) to its Customers? How does it fit into their life? What are the product's unintended uses, impacts and effects? What is the real picture of what products and services are, how they emerge and are improved in the modern, networked societies of the next century?

Stage 2: Mirroring

How can we extend and project ourselves into our products and services? When and how do Customers mentally or emotionally invest part of themselves in the products and services they buy? When and how do they merge products and services into their personal and group ideals? What are the Customers' ultimate motivations (e.g., performance, prosperity, improvement, perfection, etc.), and what are the best ways that Vendors can help them achieve those goals?

Stage 3: Mastery

If this invention makes products modifiable based on what is in Customers' heads and hearts, how do we bring that level of life to the surface and into our daily activities? Are Customer Directed Products (CDP) a medium for us to master our environment and the world? What are the possibilities for using this networked environment to help Customers and Vendors mutually achieve their ultimate goals? Can the idea (or actuality) of Customer Directed Products be marketed as the possibility (or the promise) of a perfection that is reached by rapid iterative improvements? Is this a chance for Customers see themselves and the products they choose as perfectible? A chance to bring our aspirations into our lives through our products and our lifestyles? For example, if the Customer can do it right and TELL US, then our company can make it right AND DO THAT FASTER THAN COMPETITORS. In other words, there may be a simultaneously worthwhile and seductive attraction and holding power in the relationships this invention might foster between Customers and Vendors.

Thus, a fundamental economic suggestion is that this invention may cause a material transformation in Vendor-Customer relationships by producing a two-way network in which both parties can experiment with varying degrees of Customer control. This produces potentials for evolving toward an economy where Aggregate and Defined Customer Desires (ACD and DCD) help direct and control manufacturing, services, distribution and support. This would transfer some of the conscious commercial control, guidance and direction from Vendors to Customers. It would redefine Customers in terms of their competence, preferences and control.

Since this invention is far from the only way in which society is networked, it might also help provide

Customers with a new interactive role within which to reach out to extend their influence and guidance through commercial channels. For example, it would afford market segments new opportunities to play with product concepts and test ideas for new products, new relationships with Vendors, etc. By using a spectrum of networking opportunities simultaneously, Customers might figure out some of the "rules" for a networked society faster than Vendors. For example, Customers might use other networks to organize their responses to specific products, and rapidly "feed" Vendors with preferences (i.e., an environmental group could use other types of networks to organize large numbers of people to give certain Vendors certain environmental messages about the chemicals used to manufacture their products; or an immigrant group could send messages urging greater employment of their group members by the Vendors of products sold to that group). In other words, Customers might establish dynamic partnerships with Vendors that eventually extend beyond the design of products and their associated services. What is suggested is that the design space within which a Customer Design System (CDS) may operate may turn out to be considerably larger and more flexible than the preferred embodiments described above.

Can a society even consider approaching perfection? Based on systems of Customer guidance, can we conceive of an economic system that might be more efficient and accurate in meeting customer needs than our current processes? If so, this new system could design products and services responsively in Customer-Vendor partnerships that are based on constantly evolving Customer needs, suggestions and preferences. If so, that would itself be an economic system that never existed before. But if that came to pass, that interactive economic system might evolve to provide new commercial

opportunities to design and market the type of world and society that people really want, which they would request and try to live in if they had the chance.

The ultimate transformation would be from acted-upon Customers to connected partners -- and perhaps then evolving from that to market segments of Customers that interactively guide and direct "Customer-responsive Vendors." The possibility would then exist of swinging business to these "Customer-responsive Vendors," which may provide other Vendors with financial incentives to become "Customer-responsive."

Instead of today's feeling that some global corporations are becoming aggressively dominant, the economic direction proposed by this invention would lead toward emergent Customers who are supported by major Vendors -- instead of threatened by them.

The result might be named something like "Partnership Capitalism," "Partnership Democracy" or "Democratic Capitalism." This would remain consistent with fundamental beliefs about personal freedom and free markets, with the protection of the individual and of private property, with the ability to live a quality life and to operate a profitable business. These and many more fundamental beliefs are protected and supported by this invention.

For example, "mind meetings" by means of a Customer Design System (CDS) might evolve to include some mutual goals of Customers and Vendors, through mutually designed products and services, based on this invention's new connections. For instance, these working connections may confirm the self-images of each party, based on efficient electronic partnerships that don't add the demands of daily relationships, friendships or commitments.

What might be different because of this invention, considering that a networked society will add numerous networks for immediate two-way communications between many parties? First, by means of this invention the range of offers Vendors can make to Customers is likely to be wider and more personalized. Since this is a two-way environment that may be built into an increasing spectrum of products and services, this invention may become increasingly personalized so that an increasing number of INDIVIDUAL customers may have the chance to become active participants in making THEIR products into ones that they want. By extension, they would be making this a world that they design and enjoy PERSONALLY. This process would not (and could not) come in one step. Rather, it would be based on the kind of Customer creativity that comes from the successive approximation of Adam Smith's invisible hand of the marketplace, not from a "master plan." In short, the process of a networked world is a CONVERSATION, not a declaration. But it is the type of conversation in which many would have a voice; the system facilitates interactions so that many more people might make our world into their own world.

In the end, the impact and results from an invention like this one are unknowable. Its hoped for POWER is to create unstoppable financial incentives that may eventually reshape the commercial environment. To work, those incentives must simultaneously reward individuals (Customers), corporations (Vendors) and society by providing a more efficient, more profitable and more accurate economic SYSTEM. Its hoped for GOAL is to help move the economy from a somewhat managed economic system that is concentrating economic power in the hands of a smaller number of global organizations, toward a

world that functions by reflecting what people really want and need.

Ramifications

Location and use of components of the invention:

The operation of the Customer Design System (CDS) in Figure 1 is already described in the preferred embodiments as spanning multiple locations. The division points between those locations may be moved, so that many of the connecting "lines" between parts of this invention may become either local or long-distance lines. In other words, many of the lines in the Figures between various parts and functions in this invention may be within one physical unit or they may connect two or more physical units.

For example, if the Customer Directed Product (CDP) is a PBX telephone system with several thousand users in one corporation, those users could be scattered in a number of office buildings around a metropolitan area. A single, centrally located CB-PD Module could use the voice, LED display, keypad and other features of the PBX system and it individual phone stations to investigate the utility, efficiency, user-friendliness and other aspects of the features of that PBX system. For example, it might follow-up after of a particular feature is used 282 in Fig. 10 like three-way conference calls. It could read the appropriate Customer Design Instrument (CDI) 284 and "call" a user who initiated the conference call after it was completed, to request participation 268. If the user chose to participate, the probes 294 might investigate whether or not the user felt a conference call was easy to make, what problems were encountered and what could be done to improve this feature. The user could reply by pressing numbers on the keypad 296 or by speaking replies 296 that are written as records 304. At periodic pre-set intervals, the CB-PD

Module could dial the Vendor 328 in Fig. 11 and sent the Aggregate Customer Desires (ACD) data from its various Development Interactions (DI).

Thus, the principle is clear: by varying the locations of the components of this invention, it is possible to locate more of the physical and information components of the Customer Design System (CDS) at the optimum locations that support manufacturing, maintaining and upgrading the performance of an entire system, even if the product(s) are spread over multiple locations or delivered in diverse ways. Several more examples will be provided as to how this might be accomplished.

For example, in the embodiment in Fig. 3, the facsimile machine 70, can demonstrate how a centrally located CB-PD Module might interact with many individual products and customers that are in many distant locations. The preferred embodiment that was taught included the microprocessor/ROM memory 186 and memory 198 inside the facsimile machine 70. The CB-PD Module was located inside the product; it controlled the entire Development Interaction (DI) with the Customer locally and then connected to the Vendor's computer to transmit the resulting data. As an alternative, a custom microprocessor 186 in Fig. 7 may perform only the hard-wired functions of triggering the Development Interaction (DI) at certain events and, after obtaining the Customer's participation, connect the Customer Designed Product 70 to the Vendor's computer. In this configuration, the digital-analog converter 194 and the analog-digital converter 196 would be located within the Vendor's computer and the Customer Designed Product 70 would not contain a modem 204. The Customer would conduct the Development Interaction (DI) 284 in Fig. 10 by means of voice spoken through the facsimile machine's handset 74, 78 which is then transmitted via a telephone

particular phone number and pressing numbers on the phone's keypad, etc.). The Development Interaction (DI) and response recording components of the CB-PD Module might then be located at the cable TV service. The cable TV vendor would collect the data at the station 304. If its system permits it, the cable TV Vendor might also identify the responses by household, so the product Vendor (Ford in this example) can computer-match the responses to households that have bought a Ford product to determine the validity of those Customer suggestions. It can compare households that do not own Ford products to those that do, to determine which views generalize to potential Ford customers and which do not. Ford might also buy the list of households that participate but do not own Ford products, as potential customers with whom it may be valuable to establish a relationship. This Customer Design System (CDS), as a broadcasted service, provides opportunities for current and potential Customers to assist Vendors like Ford in designing new products and services, with built-in market research systems for determining the commercial success of those designs, and for following up personally with current and potential Customers.

In addition to networks like cable TV, a variety of computerized services (like Prodigy, CompuServe and Bulletin Board Systems [BBS's]) may offer on-line Customer-Based Product Design Services like the example just described. Unlike a cable TV Vendor, however, a computerized service may provide these assessments one-on-one with individual Customers, with each Development Interaction (DI) completely personalized for that Customer by the service's computer.

Another ramification is that a CB-PD Module can be generalized into an interactive two-way networking device that can provide various types of assistance,

communications or other services, in addition to what has been described above. For example, the CB-PD Module in the telephone PBX, above, could be used by the company's human resources department to dial each employee in the company's on-line telephone directory 282, ask if it may take a moment to ask a health question 288, and if the employee agrees 288, asking whether the employee smokes cigarettes 294. If the employee says yes (such as by pressing 1 for yes and 2 for no on the telephone keypad), the next probe could ask if the employee would like to be enrolled in a stop-smoking class 294. Favorable responses could be added to a list 304 that is transmitted back to the human resources department 312 where employees are phoned and classes are scheduled.

Environments:

This CD-PD Module invention is not dependent on a specific type of hardware or on a specific software manufacturer, product vendor, product or service. The invention can be included as a product feature in various types of products and services (such as by a CB-PD Module that is built into a product and connected by a transmission means with the product's Vendor; by a desktop computer that links a customer with a product; by a television and a connection to a transmission means such as a phone line; or by other means that link a Customer with a product and a Vendor and turn that product into a Customer Directed Product).

The Customer can communicate with the CB-PD Module by utilizing any one of various media such as a LCD panel, video display screen, speaker/microphone, keypad or by other output/input means. The CB-PD Module can interface with the Customer by means of various formats and media such as a videotext format, a print format, a touch-sensitive format, a visual format or an audio format.

Customer Directed Products (CDP) may be developed by means of combining a number of different technologies in one specific product, and by combinations of them. Therefore, at any one time it is conceivable that a Customer Directed Product (CDP) may be configured differently depending on the needs of the Vendor; the type of product or service; and the available hardware, software and means of transmission. Nevertheless, the CB-PD Module is fundamentally a computing and networking module that is incorporated into a product or service to provide a Customer-based model in which the Customer uses the basic interface of this Module or the product to provide quantitative and qualitative data, new ideas, suggestions, etc. during the product's use to guide the Customer Directed Product's (CDP) Vendor in designing and evolving the product to better fit the Customer's needs and desires. Although it is possible for the configuration of the hardware, software, communication services, and other components to differ among the Customer Directed Products from different vendors, the purpose and functionality of the CB-PD Module remain the same from the point of view of both the Customer (who is looking to improve the product or service), the Vendor (who is looking to improve the relationship with that Customer and the associated sales and consumption revenues from that relationship, and the combined system of Customer and Vendor (who are looking to benefit jointly as a more efficient and effective team in providing and consuming goods and services, based on the inquiry, design, interactive and communications capabilities of the CB-PD Module).

What is claimed is:

Claims

1. A product sub-system that interacts with a user, gathering information from said user, communicating said information to the product's vendor, and receiving new pre-programmed interactions for future interactions with said user.

2. Apparatus as in claim 1 wherein said means for said sub-system to interact with said user may be initiated by said user.

3. Apparatus as in claim 1 wherein said means for said sub-system to interact with said user may be initiated by said sub-system, by means of pre-set trigger points when they fall within parameters such as times and dates, number of product uses, use of a specific product feature, or other parameters; including means for storing said interaction without execution if said trigger is not within said parameters.

4. Apparatus as in claim 1 wherein said sub-system may be removable or may be a permanent, built-in feature of said product.

5. Apparatus as in claim 1 wherein said means for gathering information from said user includes means for the user to input data, said input means including keypad, keyboard, function keys, microphone, or other information gathering means.

6. Apparatus as in claim 1 wherein said means for gathering information from said user includes means for the user to receive information, said reception means to include a display, a speaker, a beeper, or other user reception means.

7. Apparatus as in claim 1 wherein said means for communicating said information to said product's vendor, said communications means to include a radio transmitter/receiver, a removable/replaceable memory chip, a connector to a data reader/programmer, a digital or analog link to a communications network, or other communication means.

8. Apparatus as in claim 1 wherein said sub-system includes means for storing pre-programmed interactions with said user, and means for storing said information gathered from said user.

9. Apparatus as in claim 1 wherein said sub-system includes means for receiving new pre-programmed interactions from said vendor, and storing said pre-programmed interactions for later interactions with said user.

10. Apparatus as in claims 8 and 9 wherein said sub-system includes means for storing and selecting from a plurality of pre-programmed interactions with said user; and includes means for storing user information gathered from a plurality of interactions.

11. Apparatus as in claims 3 and 10 wherein said product sub-system includes means for selecting the appropriate pre-programmed interaction in response to a particular trigger.

12. Apparatus as in claim 1 wherein said means for linking with said vendor's computer includes means for calling said vendor's computer by means of a keypad, function keys or other means.

13. Apparatus as in claim 11 wherein said sub-system includes means for providing interactive help to said user.

14. Apparatus as in claim 11 wherein said sub-system includes means for conducting transactions with said user.

15. Apparatus as in claim 1 wherein said sub-system includes means for two-way real-time communications with said user.

16. Apparatus as in claim 1, wherein said sub-system includes means for communicating with more than one said vendor; means for sending user information to more than one said vendor; and means for receiving pre-programmed interactions for future said interactions with said user from more than one said vendor.

17. A product that contains a sub-system for interacting with a user wherein said interactions typically involve said user in identifying problems and providing suggestions for the purposes of improving the product or services related to it, by means of gathering information from said user and communicating said information to the product's vendor.

18. A data processing system for constructing interactions with a product's user; said system including means for writing said interactions; means for saving said interactions; means for retrieving said interactions; means for displaying said interactions; means for combining said interactions; means for editing said interactions; means for deleting said interactions; means for downloading said interactions to a product sub-system that interacts with a user of said product; and means for re-programming said product sub-system as part of downloading said interactions to it.

19. A system in accordance with claim 18 wherein said retrieval of said interactions may be from local storage or from remote storage on another computer system.

20. A system in accordance with claim 18 wherein said display of said interactions includes means for display of logical views of said interactions while under construction; said logical views to be based on characteristics such as a specific interaction, a specific product, a specific type of interaction, or other characteristics.

21. A system in accordance with claim 18 wherein said constructed interactions may be for passive recording of components of said user's usage of said product.

22. A system in accordance with claim 18 wherein said interactions may be programmed to be initiated by a list of triggers; including means for said triggers to be added, modified and deleted from said list; and means for said triggers to include parameters such as times and dates, number of product uses, use of a specific product feature, or other parameters.

23. A system in accordance with claim 18 wherein said downloading of said interactions to a product sub-system may take place immediately upon command, or may be programmed to take place upon the occurrence of pre-specified events such as the future communications linking of said product sub-system with said data processing system for constructing and downloading said interactions.

24. Apparatus for linking a product sub-system with a vendor's computer, wherein said product sub-system has gathered information from said user for communication to said vendor's computer, wherein said vendor's computer may contain new user interactions prepared for downloading to said product sub-system; said apparatus including means for linking with said product sub-system; means for linking with said vendor's computer; means for receiving data from said product sub-system and said vendor's computer; means for storing data received; means for sending said vendor computer's data to said product sub-system; and means for sending said product sub-system's data to said vendor computer.

25. Apparatus for linking a product sub-system with a vendor's computer, wherein said product sub-system has gathered information from said user for communication to said vendor's computer, wherein said vendor's computer may contain new user interactions prepared for downloading to said product sub-system; said apparatus including means for linking with said vendor's computer; means for sending data directly from said product sub-system to said vendor's computer; means for sending data from said vendor's computer to said product sub-system; and means for said product sub-system and said vendor's computer to store the data they receive.

26. Apparatus as in claims 24 or 25 wherein said means for linking with said vendor's computer includes means for dialing said vendor's computer by a keypad, function keys or other means.

27. Apparatus as in claims 24 or 25 wherein said means for linking with said vendor's computer may be local by means of a direct connection, or remotely by means of a third-party communications or service provider.

28. Apparatus as in claims 24 or 25 wherein said means for linking with said vendor's computer may transmit encrypted information.

29. Apparatus as in claims 24 or 25 wherein said means for linking with said vendor's computer may include means for identification of the product sub-system; means for identification of the vendor's computer; and means for authenticating the validity of the connection before proceeding with said communications.

30. Apparatus as in claim 24 wherein said means for linking with said vendor's computer and means for linking with said product sub-system may be simultaneous, with said data passed directly through said apparatus.

31. A data processing system that is built-into products and services to interact with a user, gather information from said user and communicate said information to the product's vendor.

32. A system as in claim 31, further including means for initiating interactions with said users upon the occurrence of pre-programmed trigger events; and means for reading the appropriate interaction from a plurality of stored interactions, upon the occurrence of a particular said trigger.

33. A system as in claim 31, further including means for requesting said user's voluntary participation in said interaction; and means for permitting said user to exit from said interaction at any time.

34. A system as in claim 31, further including means for proposing one probe at a time to said user; means for reading said user's input; means for checking said user's said input for errors and requesting corrections if needed; and means for writing said user's information to storage.

35. A system as in claim 32, further including means for silently recording components of said user's usage of said product.

36. A system as in claim 31, further including means for encrypting said information received from said user.

37. A system as in claim 31, further including means for determining an appropriate time for communicating said information from said user to said vendor; means for requesting that said user assist in the said transmission; and means for instructing said user in the steps of said transmission, including the steps of receiving new pre-programmed interactions from said vendor.

38. A system as in claim 31, further including means for communicating with more than one said vendor; means for sending user information to more than one said vendor; and means for receiving pre-programmed interactions for future said interactions with said user from more than one said vendor.

39. A data processing system for concurrently processing plural sets of information and reporting the resulting analyses and reports to vendor employees wherein product sub-systems have interacted with users, gathered said sets of information from said users, and communicated said information to the computer of the vendor of said products; said method including means for running pre-written analyses and reports at the direction of said employees; means for constructing new analyses and reports; means for saving said new analyses and reports; means for combining and editing said analyses and reports; and means for running pre-written analyses and reports automatically at pre-set triggers.

40. A system as in claim 39 wherein said means for said automatic processing of said of information includes means to pre-set trigger points for said automatic processing; means to set said triggers based on times and dates, number of sets of information available to process, number of uses of a specific product feature, or other parameters; and means for storing said automatic processing without execution if said trigger is not within said parameters.

41. A method for the users of products and services to interact with products and services, including means for said users to provide information such as design and service improvements during said interactions with said products and services; means for storing said information from said users; means for transmitting said information to the vendors of those products and services; means for storing said information from said users of products and services in said vendors' computers; and means for processing and reporting said information to employees of said vendors.

42. Method as in claim 41 wherein said analyzed information is reported to employees of vendors, providing them means to improve decisions such as product designs, product management, corporate resource allocation, and services to particular users or groups of users.

43. The apparatuses of claims 1, 17, 24 and 25 wherein products and services are high-level concepts that include the means for said users to provide said information to assist in providing conceptual commercial direction to said vendors, both in individual cases and in aggregate.

44. The system of claims 18, 31 and 39 wherein products and services are high-level concepts that include the means for said users to provide said information to assist in providing conceptual commercial direction to said vendors, both in individual cases and in aggregate.

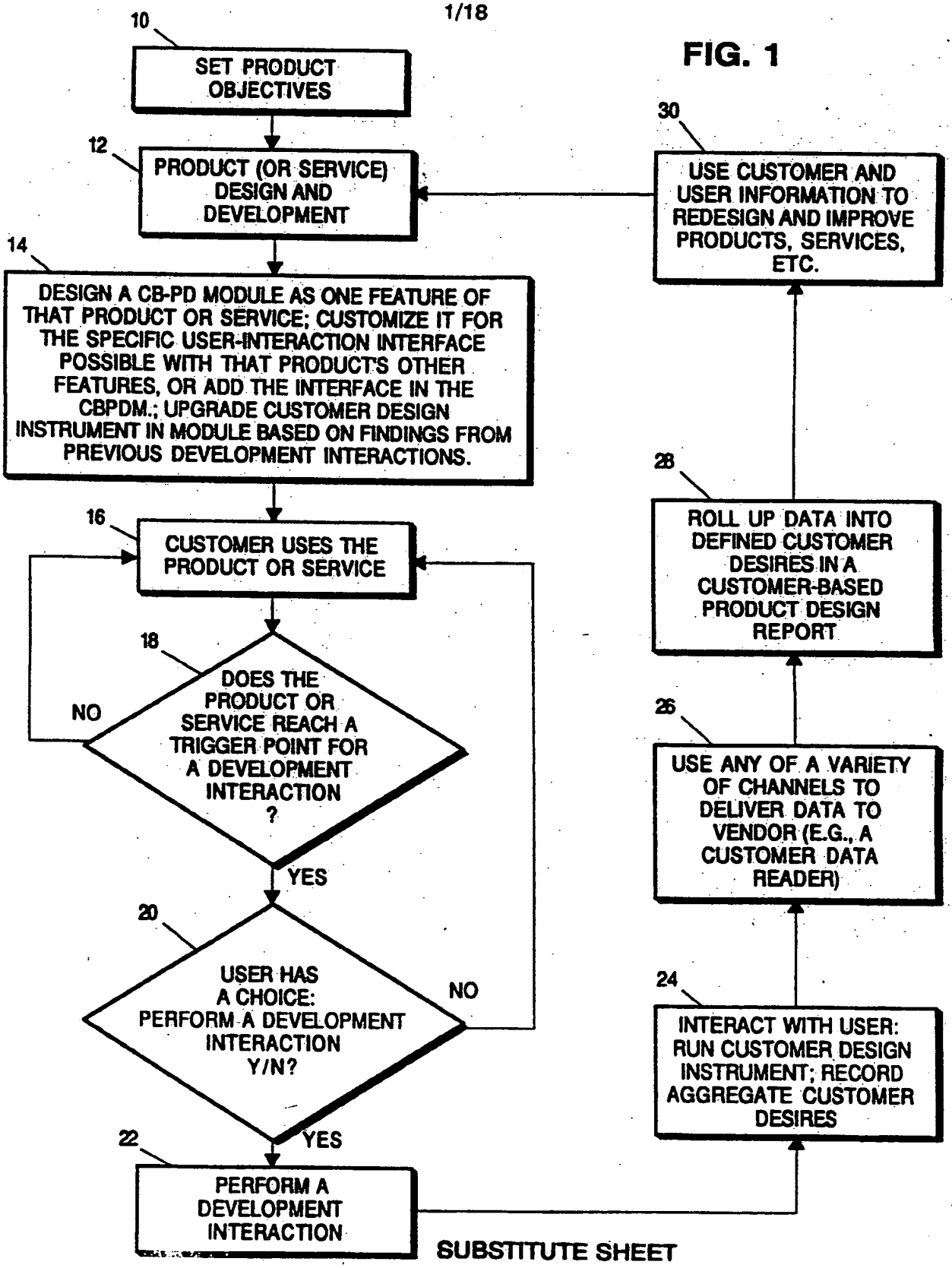
45. The economic system that results from the method of claims 43 and 44, wherein the economic system gains greater efficiencies in designing and manufacturing the products and services users want to buy.

46. The economic system that results from the method of claims 43 and 44, wherein the participants in said economic system gain greater ability to understand said products and services; including the means for forming networks whose interactions between said users, said products and services, and said vendors improve the quality and performance of said products and services; and means for continually improving the current state of knowledge about how to satisfy said users on said networks.

47. Apparatus as in claims 1 or 17 wherein said product may be a service.

48. A system as in claims 18 or 31 wherein said product may be a service.

FIG. 1


10
SET PRODUCT OBJECTIVES
12
PRODUCT (OR SERVICE) DESIGN AND DEVELOPMENT
14
DESIGN A CB-PD MODULE AS ONE FEATURE OF THAT PRODUCT OR SERVICE; CUSTOMIZE IT FOR THE SPECIFIC USER-INTERACTION INTERFACE POSSIBLE WITH THAT PRODUCT'S OTHER FEATURES, OR ADD THE INTERFACE IN THE CBPDM.; UPGRADE CUSTOMER DESIGN INSTRUMENT IN MODULE BASED ON FINDINGS FROM PREVIOUS DEVELOPMENT INTERACTIONS.
16
CUSTOMER USES THE PRODUCT OR SERVICE
18
DOES THE PRODUCT OR SERVICE REACH A TRIGGER POINT FOR A DEVELOPMENT INTERACTION ?
NO
YES
20
USER HAS A CHOICE: PERFORM A DEVELOPMENT INTERACTION Y/N?
NO
YES
22
PERFORM A DEVELOPMENT INTERACTION
24
INTERACT WITH USER: RUN CUSTOMER DESIGN INSTRUMENT; RECORD AGGREGATE CUSTOMER DESIRES
26
USE ANY OF A VARIETY OF CHANNELS TO DELIVER DATA TO VENDOR (E.G., A CUSTOMER DATA READER)
28
ROLL UP DATA INTO DEFINED CUSTOMER DESIRES IN A CUSTOMER-BASED PRODUCT DESIGN REPORT
30
USE CUSTOMER AND USER INFORMATION TO REDESIGN AND IMPROVE PRODUCTS, SERVICES, ETC.

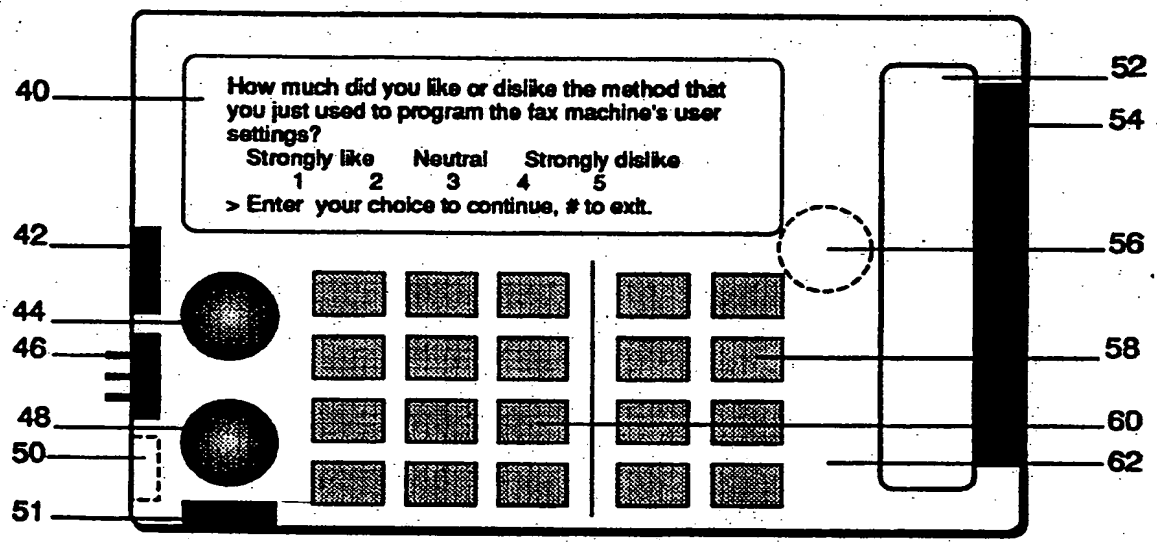

How much did you like or dislike the method that you just used to program the fax machine's user settings?
Strongly like 1 2 Neutral 3 4 Strongly dislike 5
> Enter your choice to continue, # to exit.
40
42
44
46
48
50
51
52
54
56
58
60
62

FIG. 2

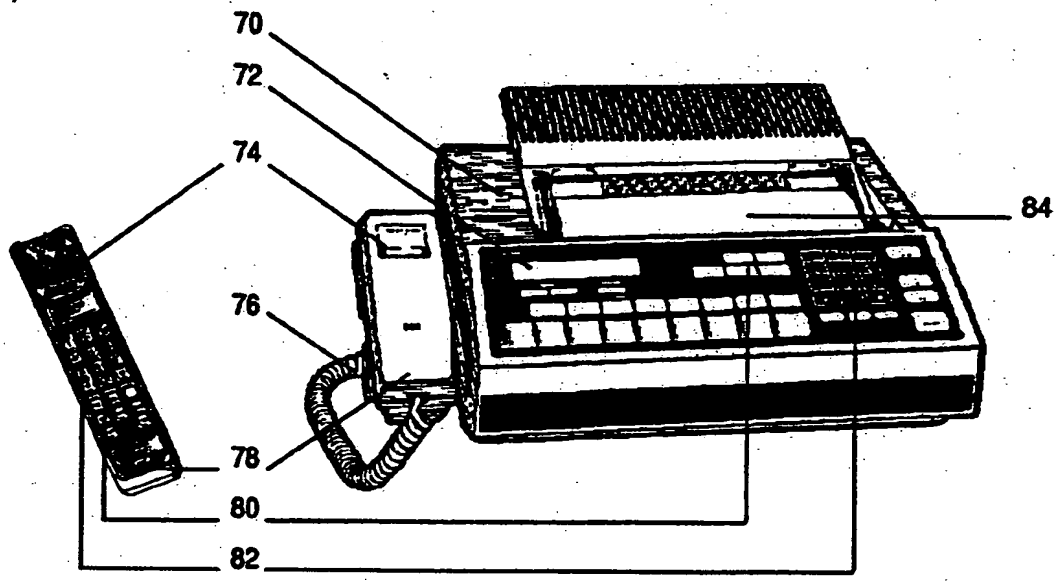


FIG. 3

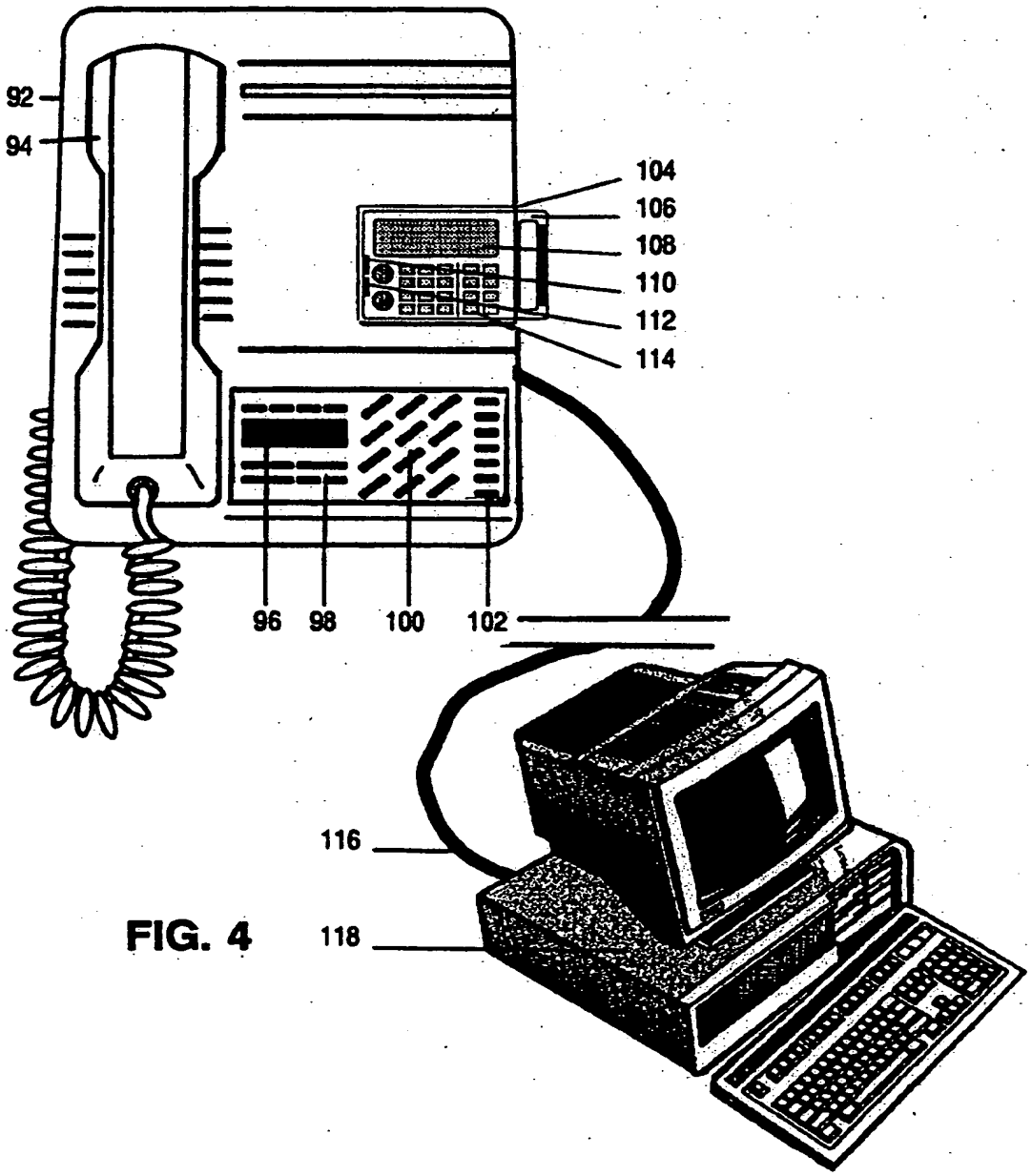


FIG. 4

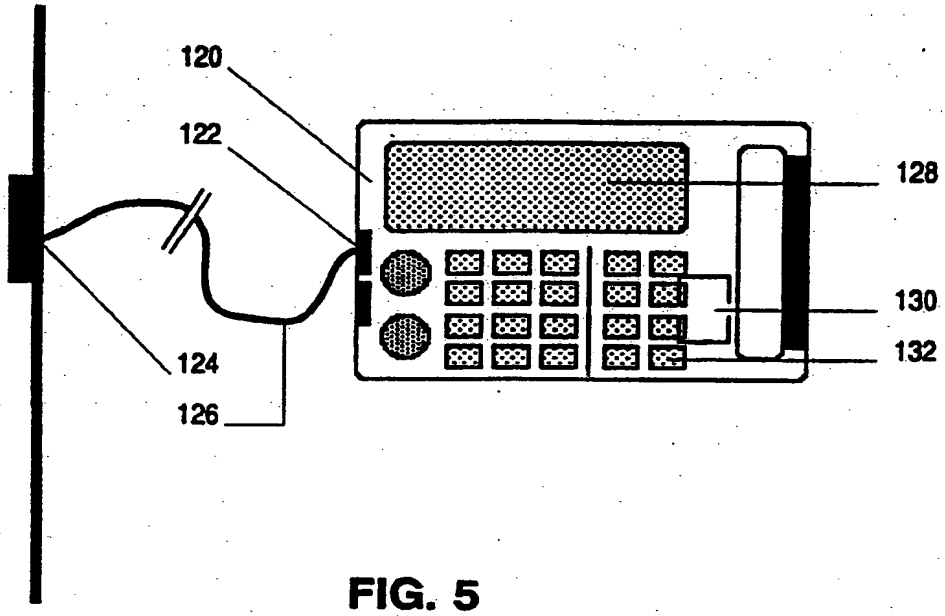


FIG. 5

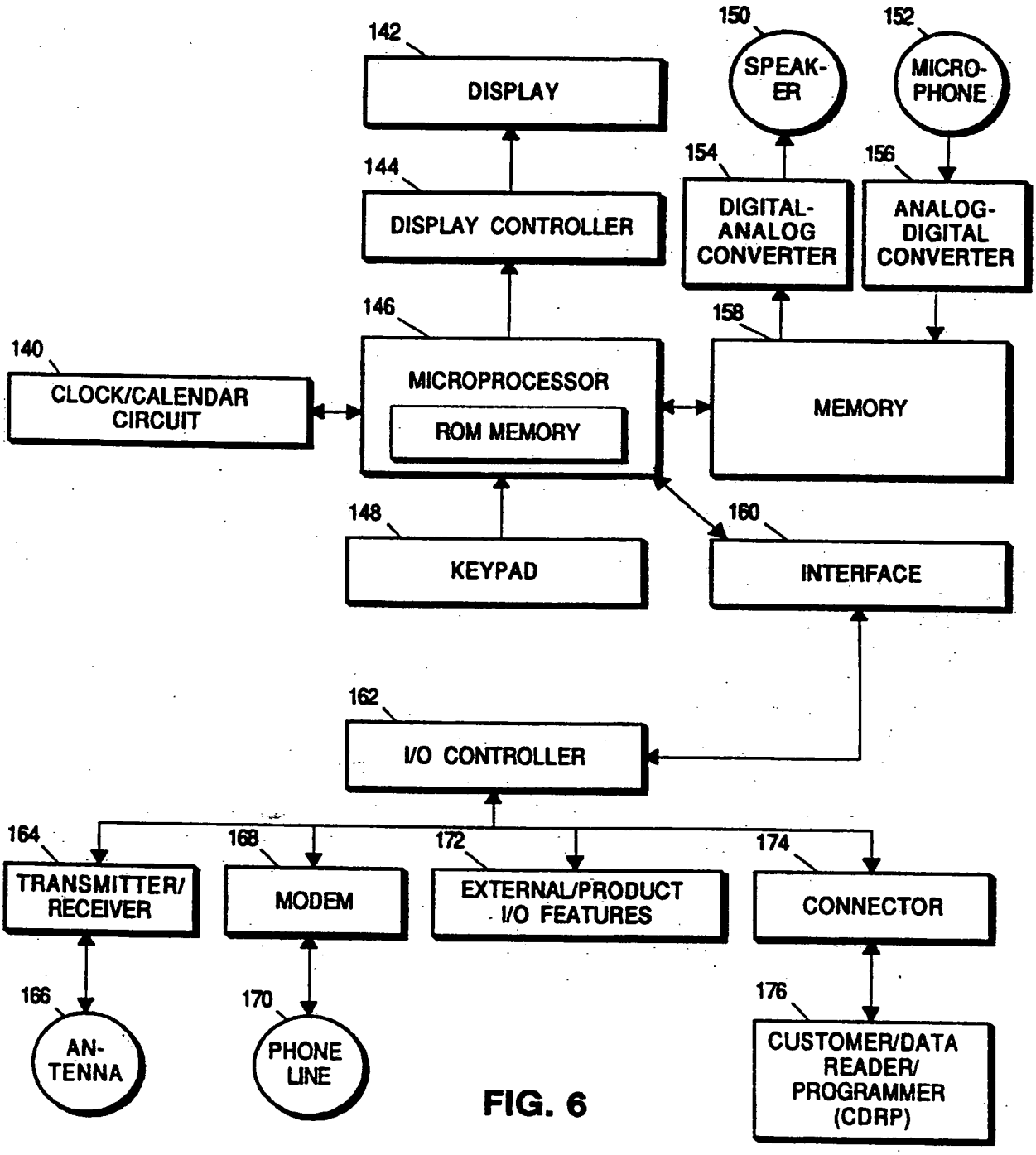

142
DISPLAY
150
SPEAK-ER
152
MICRO-PHONE
144
DISPLAY CONTROLLER
154
DIGITAL-ANALOG CONVERTER
156
ANALOG-DIGITAL CONVERTER
146
158
140
CLOCK/CALENDAR CIRCUIT
MICROPROCESSOR
ROM MEMORY
MEMORY
148
KEYPAD
160
INTERFACE
162
I/O CONTROLLER
164
TRANSMITTER/ RECEIVER
168
MODEM
172
EXTERNAL/PRODUCT I/O FEATURES
174
CONNECTOR
166
AN-TENNA
170
PHONE LINE
176
CUSTOMER/DATA READER/ PROGRAMMER (CDRP)

FIG. 6

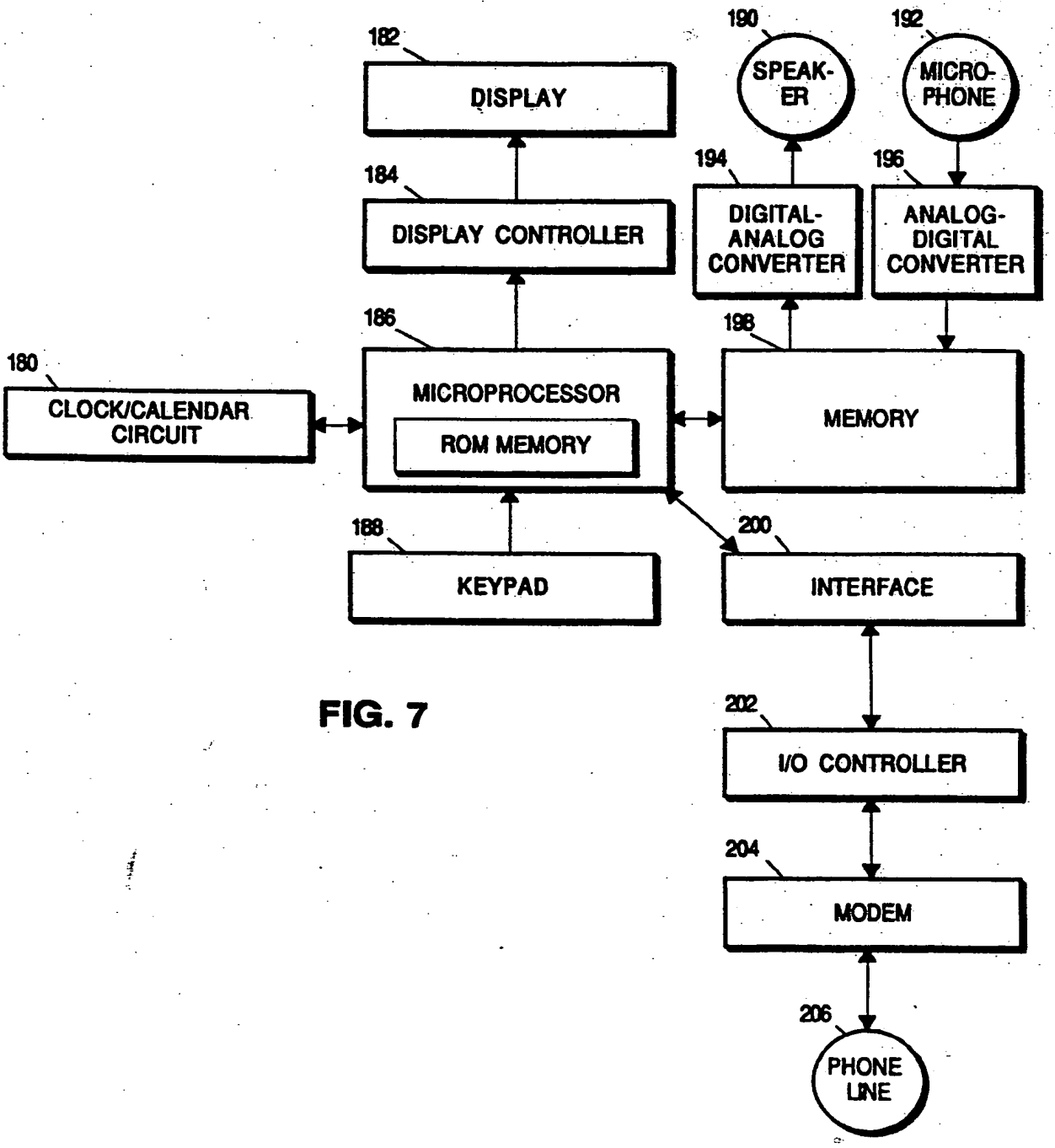

182
DISPLAY
190
SPEAK-
ER
192
MICRO-
PHONE
184
DISPLAY CONTROLLER
194
DIGITAL-
ANALOG
CONVERTER
196
ANALOG-
DIGITAL
CONVERTER
186
198
180
CLOCK/CALENDAR
CIRCUIT
MICROPROCESSOR
ROM MEMORY
MEMORY
188
KEYPAD
200
INTERFACE
202
I/O CONTROLLER
204
MODEM
206
PHONE
LINE

FIG. 7

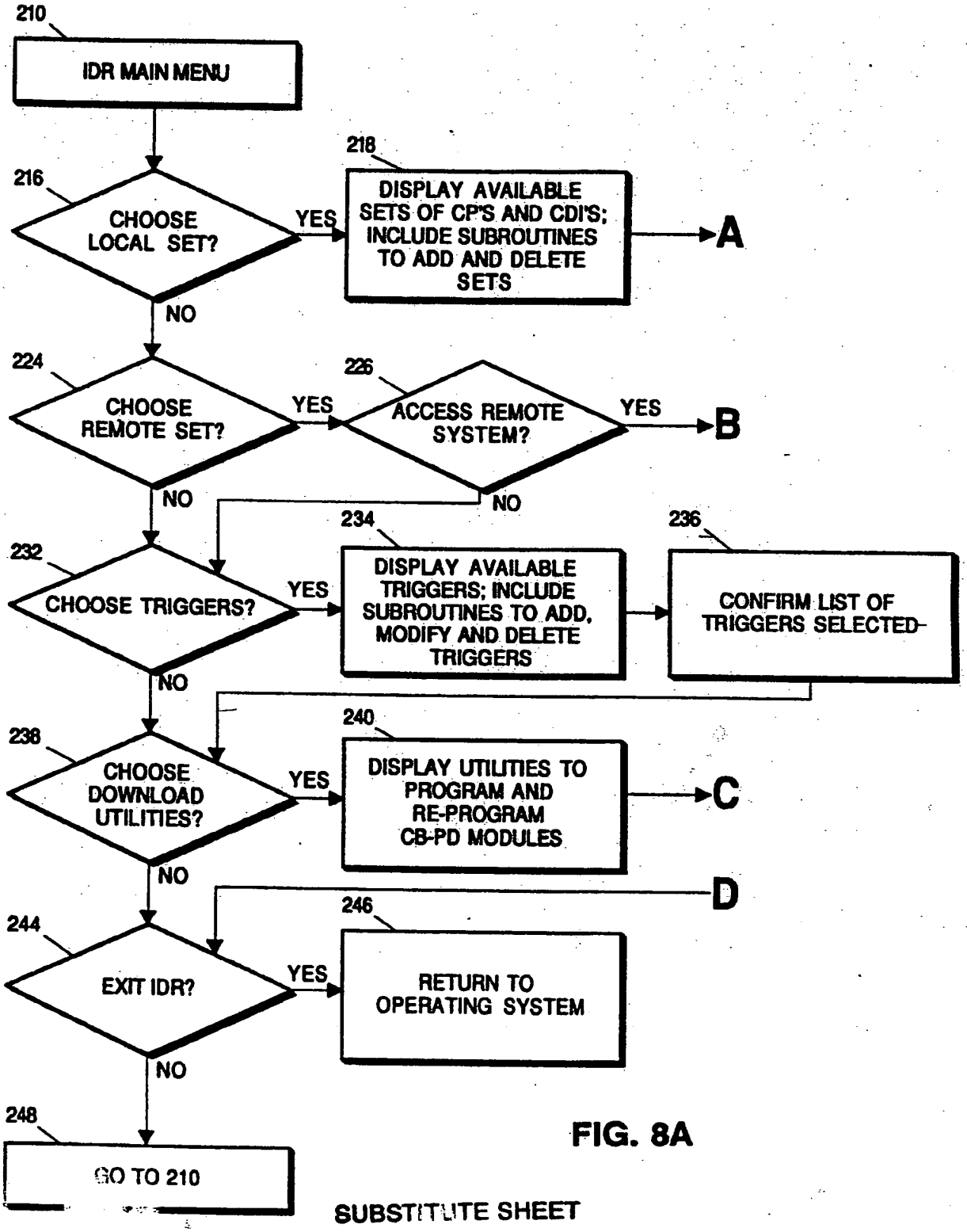

210
IDR MAIN MENU
216
CHOOSE LOCAL SET?
YES
218
DISPLAY AVAILABLE SETS OF CP'S AND CDI'S; INCLUDE SUBROUTINES TO ADD AND DELETE SETS
A
NO
224
CHOOSE REMOTE SET?
YES
226
ACCESS REMOTE SYSTEM?
YES
B
NO
NO
232
CHOOSE TRIGGERS?
YES
234
DISPLAY AVAILABLE TRIGGERS; INCLUDE SUBROUTINES TO ADD, MODIFY AND DELETE TRIGGERS
236
CONFIRM LIST OF TRIGGERS SELECTED
NO
238
CHOOSE DOWNLOAD UTILITIES?
YES
240
DISPLAY UTILITIES TO PROGRAM AND RE-PROGRAM CB-PD MODULES
C
NO
D
244
EXIT IDR?
YES
246
RETURN TO OPERATING SYSTEM
NO
248
GO TO 210

FIG. 8A

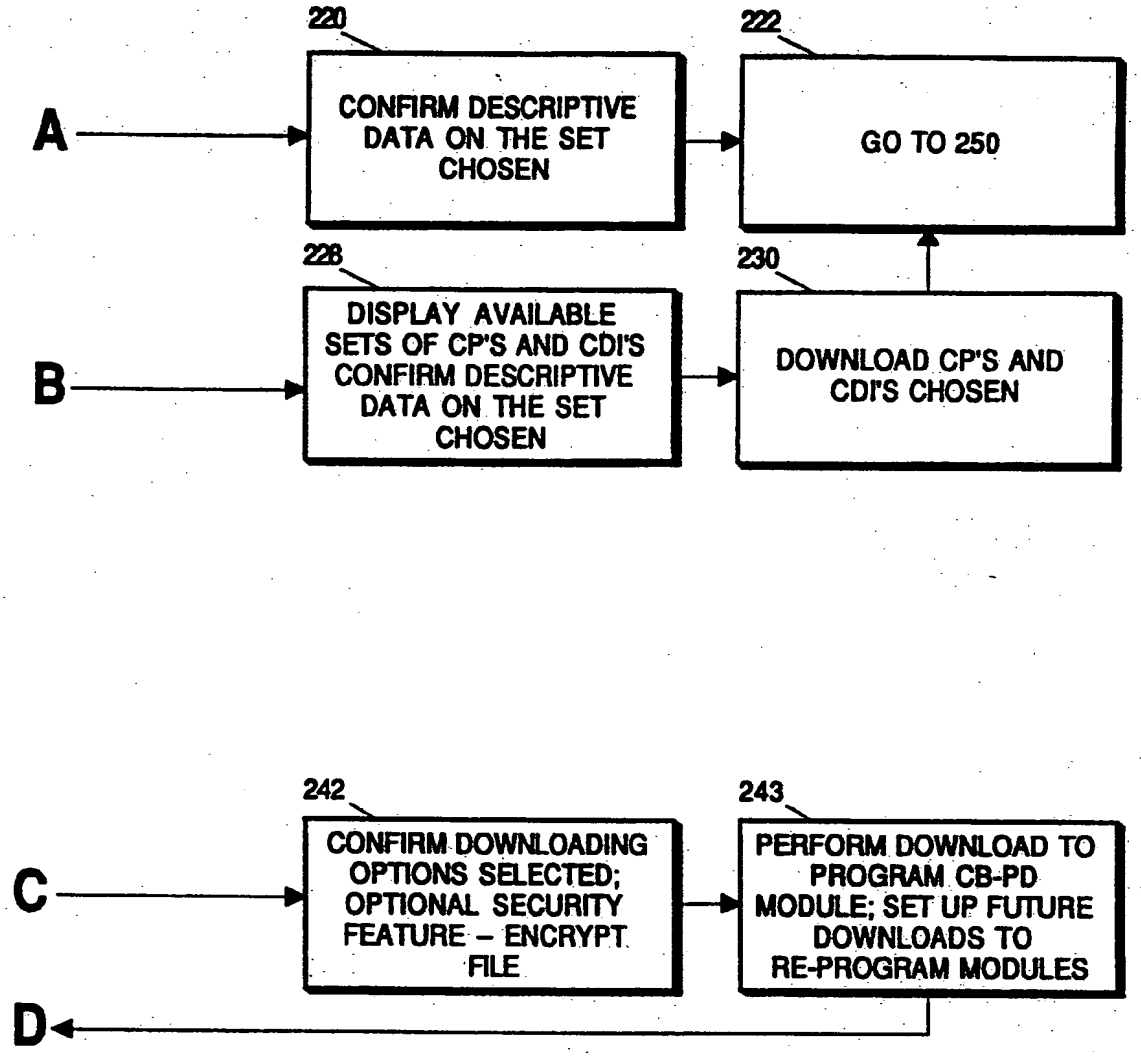

220
222
A
CONFIRM DESCRIPTIVE DATA ON THE SET CHOSEN
GO TO 250
228
230
B
DISPLAY AVAILABLE SETS OF CP'S AND CDI'S CONFIRM DESCRIPTIVE DATA ON THE SET CHOSEN
DOWNLOAD CP'S AND CDI'S CHOSEN
242
243
C
CONFIRM DOWNLOADING OPTIONS SELECTED; OPTIONAL SECURITY FEATURE – ENCRYPT FILE
PERFORM DOWNLOAD TO PROGRAM CB-PD MODULE; SET UP FUTURE DOWNLOADS TO RE-PROGRAM MODULES
D

FIG. 8B

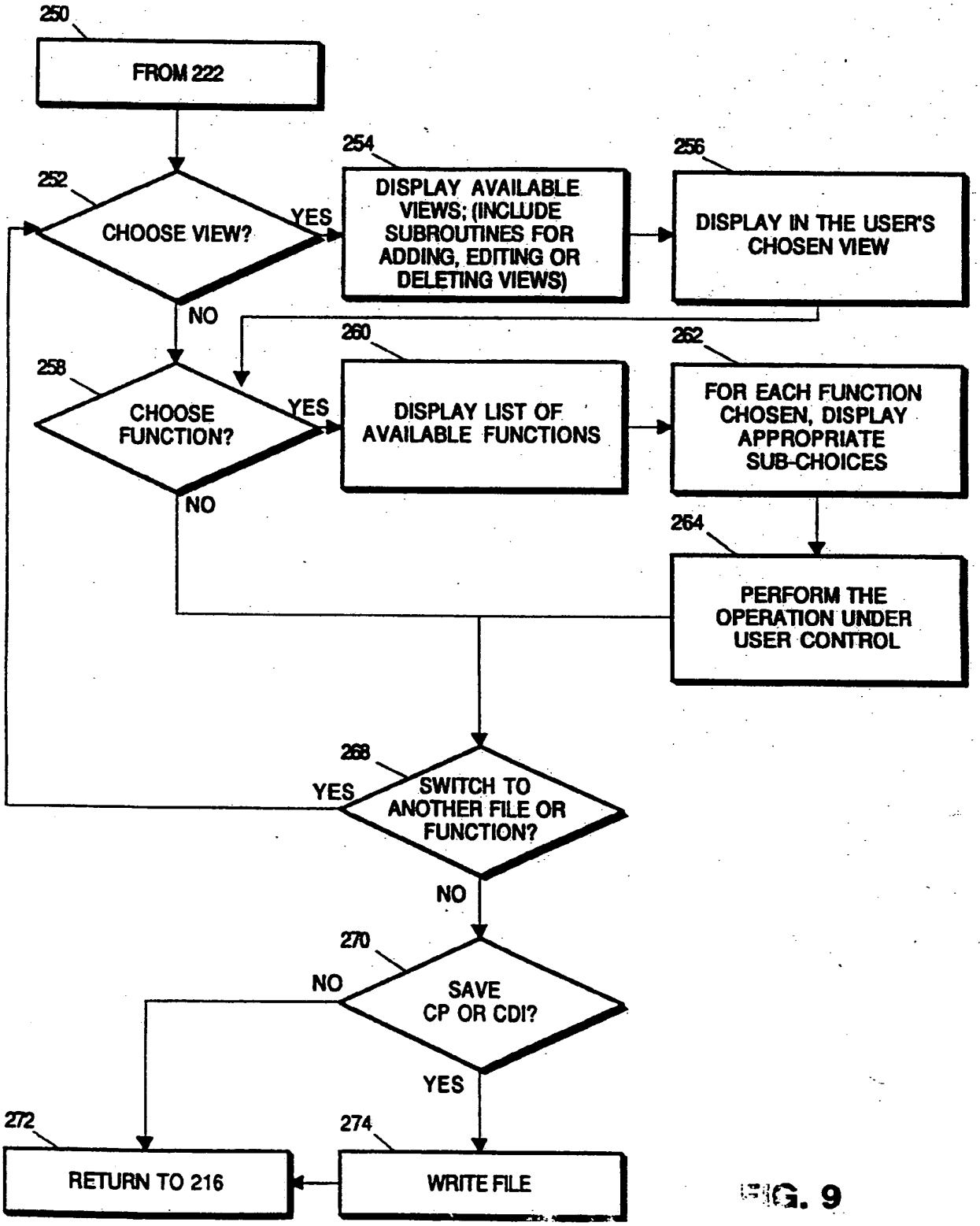

250
FROM 222
252
CHOOSE VIEW?
YES
NO
254
DISPLAY AVAILABLE VIEWS; (INCLUDE SUBROUTINES FOR ADDING, EDITING OR DELETING VIEWS)
256
DISPLAY IN THE USER'S CHOSEN VIEW
258
CHOOSE FUNCTION?
YES
NO
260
DISPLAY LIST OF AVAILABLE FUNCTIONS
262
FOR EACH FUNCTION CHOSEN, DISPLAY APPROPRIATE SUB-CHOICES
264
PERFORM THE OPERATION UNDER USER CONTROL
268
SWITCH TO ANOTHER FILE OR FUNCTION?
YES
NO
270
SAVE CP OR CDI?
NO
YES
272
RETURN TO 216
274
WRITE FILE

FIG. 9

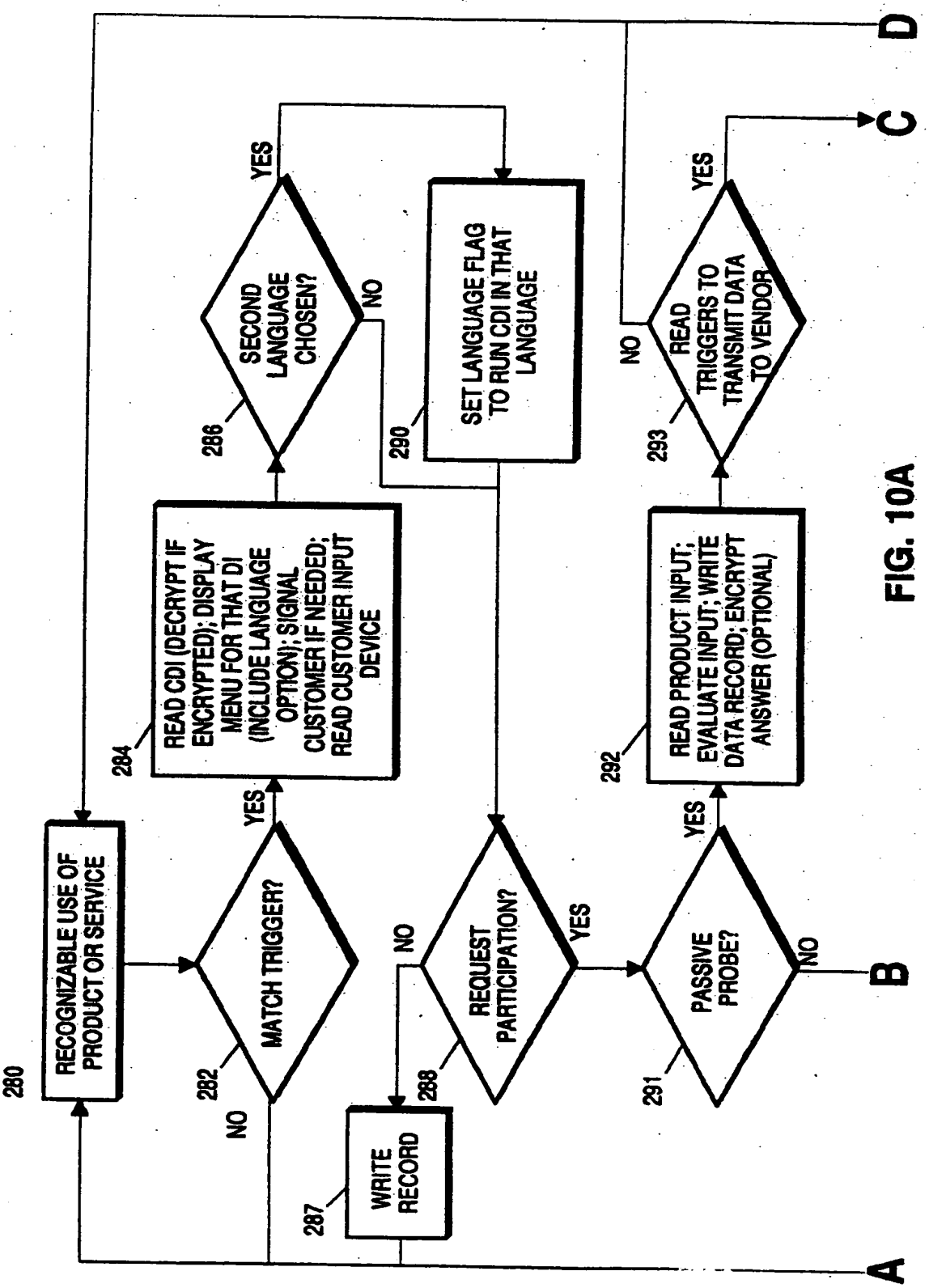

RECOGNIZABLE USE OF PRODUCT OR SERVICE
280
MATCH TRIGGER?
282
YES
NO
READ CDI (DECRYPT IF ENCRYPTED); DISPLAY MENU FOR THAT DI (INCLUDE LANGUAGE OPTION); SIGNAL CUSTOMER IF NEEDED; READ CUSTOMER INPUT DEVICE
284
SECOND LANGUAGE CHOSEN?
286
YES
NO
SET LANGUAGE FLAG TO RUN CDI IN THAT LANGUAGE
290
WRITE RECORD
287
REQUEST PARTICIPATION?
288
NO
YES
READ PRODUCT INPUT; EVALUATE INPUT; WRITE DATA RECORD; ENCRYPT ANSWER (OPTIONAL)
292
PASSIVE PROBE?
291
YES
NO
READ TRIGGERS TO TRANSMIT DATA TO VENDOR
293
NO
YES
A
B
C
D

FIG. 10A

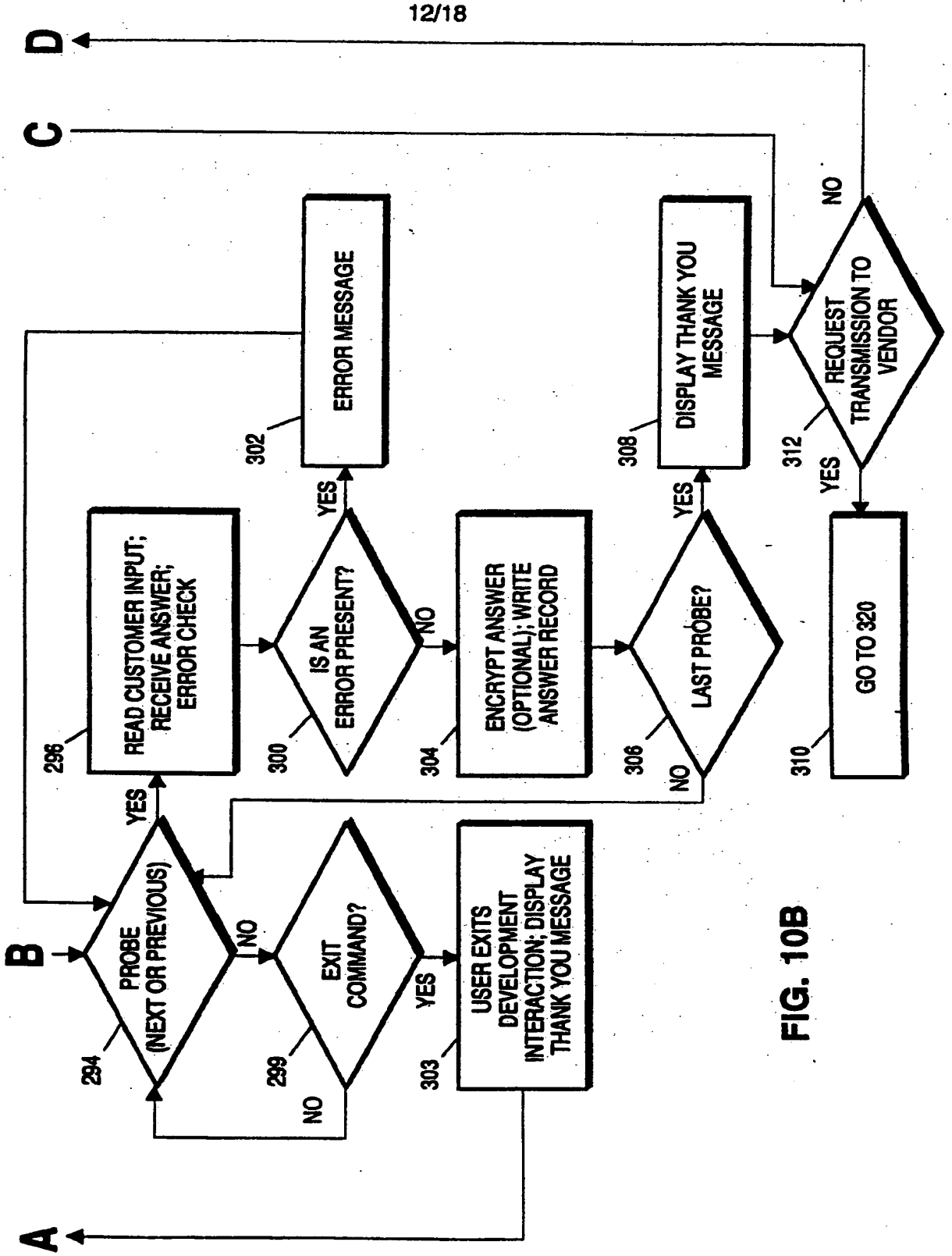

A
B
C
D
294
PROBE (NEXT OR PREVIOUS)
YES
NO
299
EXIT COMMAND?
YES
NO
303
USER EXITS DEVELOPMENT INTERACTION; DISPLAY THANK YOU MESSAGE
296
READ CUSTOMER INPUT; RECEIVE ANSWER; ERROR CHECK
300
IS AN ERROR PRESENT?
YES
NO
302
ERROR MESSAGE
304
ENCRYPT ANSWER (OPTIONAL); WRITE ANSWER RECORD
306
LAST PROBE?
YES
NO
308
DISPLAY THANK YOU MESSAGE
312
REQUEST TRANSMISSION TO VENDOR
YES
NO
310
GO TO 320

FIG. 10B

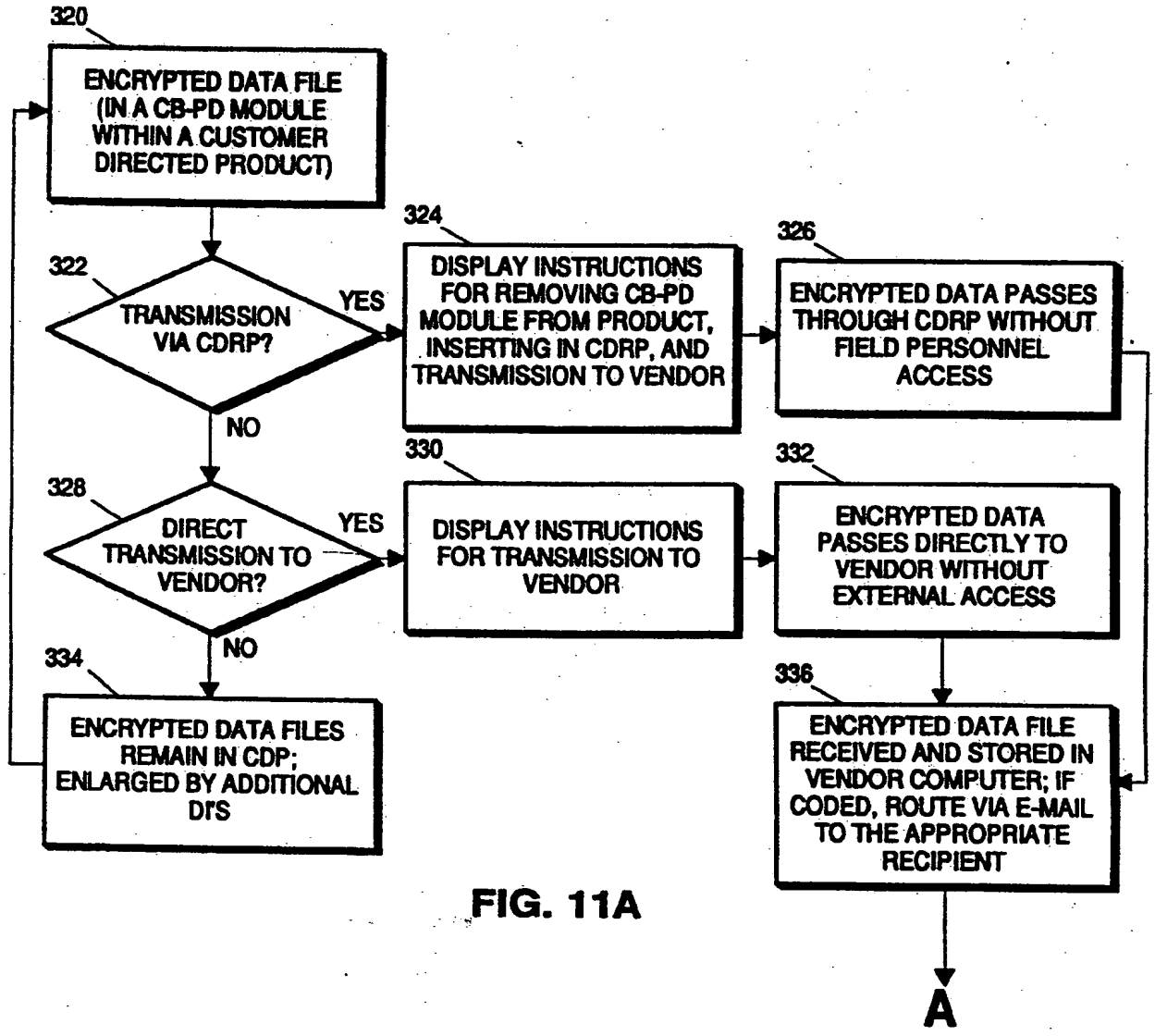

320
ENCRYPTED DATA FILE (IN A CB-PD MODULE WITHIN A CUSTOMER DIRECTED PRODUCT)
322
TRANSMISSION VIA CDRP?
YES
NO
324
DISPLAY INSTRUCTIONS FOR REMOVING CB-PD MODULE FROM PRODUCT, INSERTING IN CDRP, AND TRANSMISSION TO VENDOR
326
ENCRYPTED DATA PASSES THROUGH CDRP WITHOUT FIELD PERSONNEL ACCESS
328
DIRECT TRANSMISSION TO VENDOR?
YES
NO
330
DISPLAY INSTRUCTIONS FOR TRANSMISSION TO VENDOR
332
ENCRYPTED DATA PASSES DIRECTLY TO VENDOR WITHOUT EXTERNAL ACCESS
334
ENCRYPTED DATA FILES REMAIN IN CDP; ENLARGED BY ADDITIONAL DFS
336
ENCRYPTED DATA FILE RECEIVED AND STORED IN VENDOR COMPUTER; IF CODED, ROUTE VIA E-MAIL TO THE APPROPRIATE RECIPIENT
A

FIG. 11A

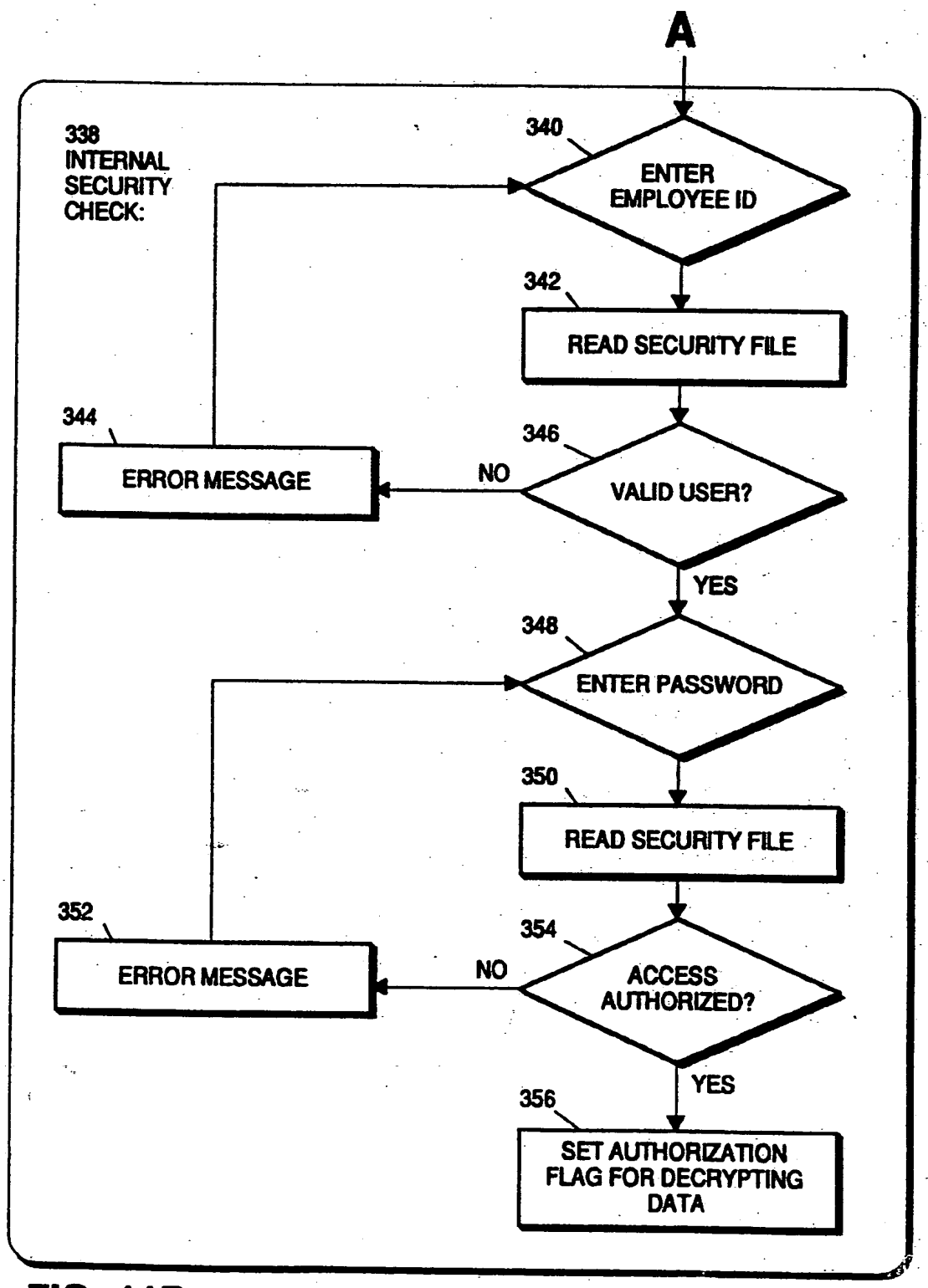

A
338
INTERNAL
SECURITY
CHECK:
340
ENTER
EMPLOYEE ID
342
READ SECURITY FILE
344
ERROR MESSAGE
NO
346
VALID USER?
YES
348
ENTER PASSWORD
350
READ SECURITY FILE
352
ERROR MESSAGE
NO
354
ACCESS
AUTHORIZED?
YES
356
SET AUTHORIZATION
FLAG FOR DECRYPTING
DATA

FIG. 11B

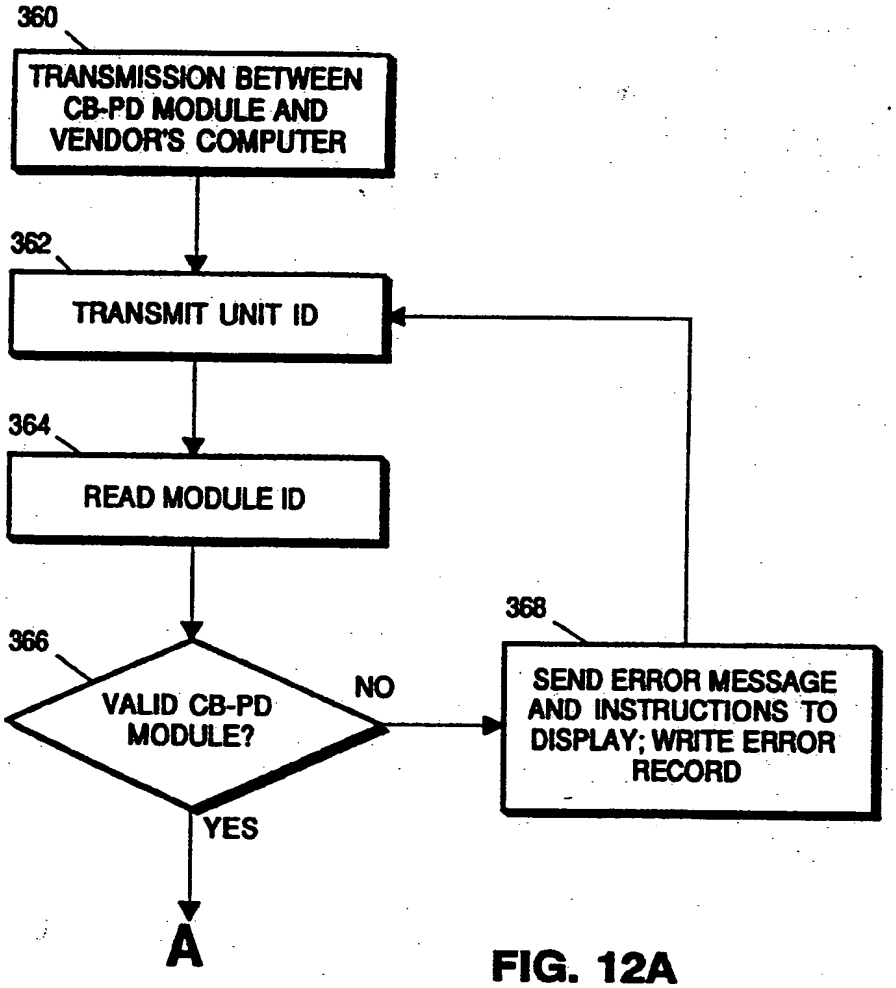

360
TRANSMISSION BETWEEN CB-PD MODULE AND VENDOR'S COMPUTER
362
TRANSMIT UNIT ID
364
READ MODULE ID
366
VALID CB-PD MODULE?
NO
368
SEND ERROR MESSAGE AND INSTRUCTIONS TO DISPLAY; WRITE ERROR RECORD
YES
A

FIG. 12A

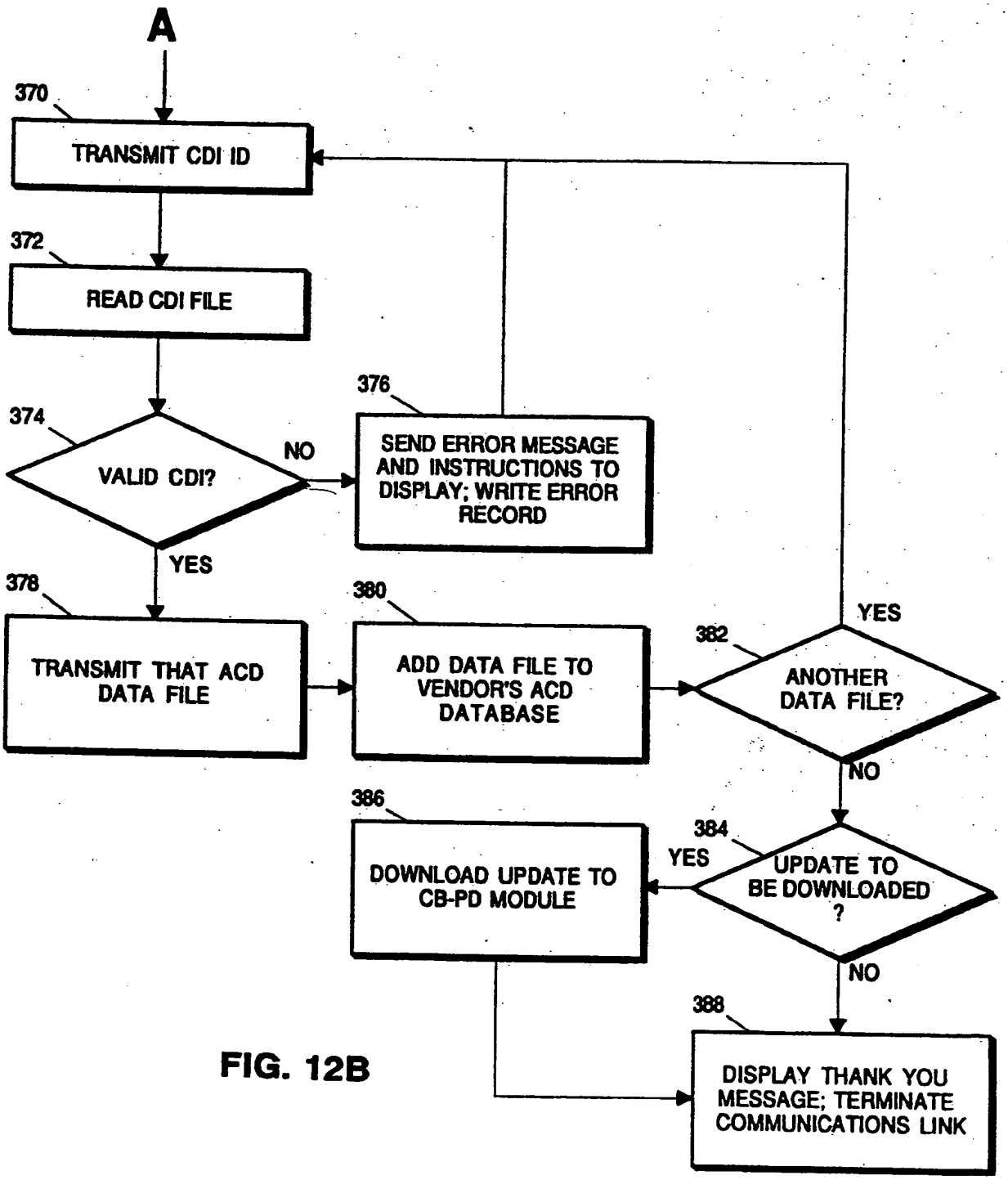

A
370
TRANSMIT CDI ID
372
READ CDI FILE
374
VALID CDI?
NO
376
SEND ERROR MESSAGE AND INSTRUCTIONS TO DISPLAY; WRITE ERROR RECORD
YES
378
TRANSMIT THAT ACD DATA FILE
380
ADD DATA FILE TO VENDOR'S ACD DATABASE
382
ANOTHER DATA FILE?
YES
NO
384
UPDATE TO BE DOWNLOADED ?
YES
386
DOWNLOAD UPDATE TO CB-PD MODULE
NO
388
DISPLAY THANK YOU MESSAGE; TERMINATE COMMUNICATIONS LINK

FIG. 12B

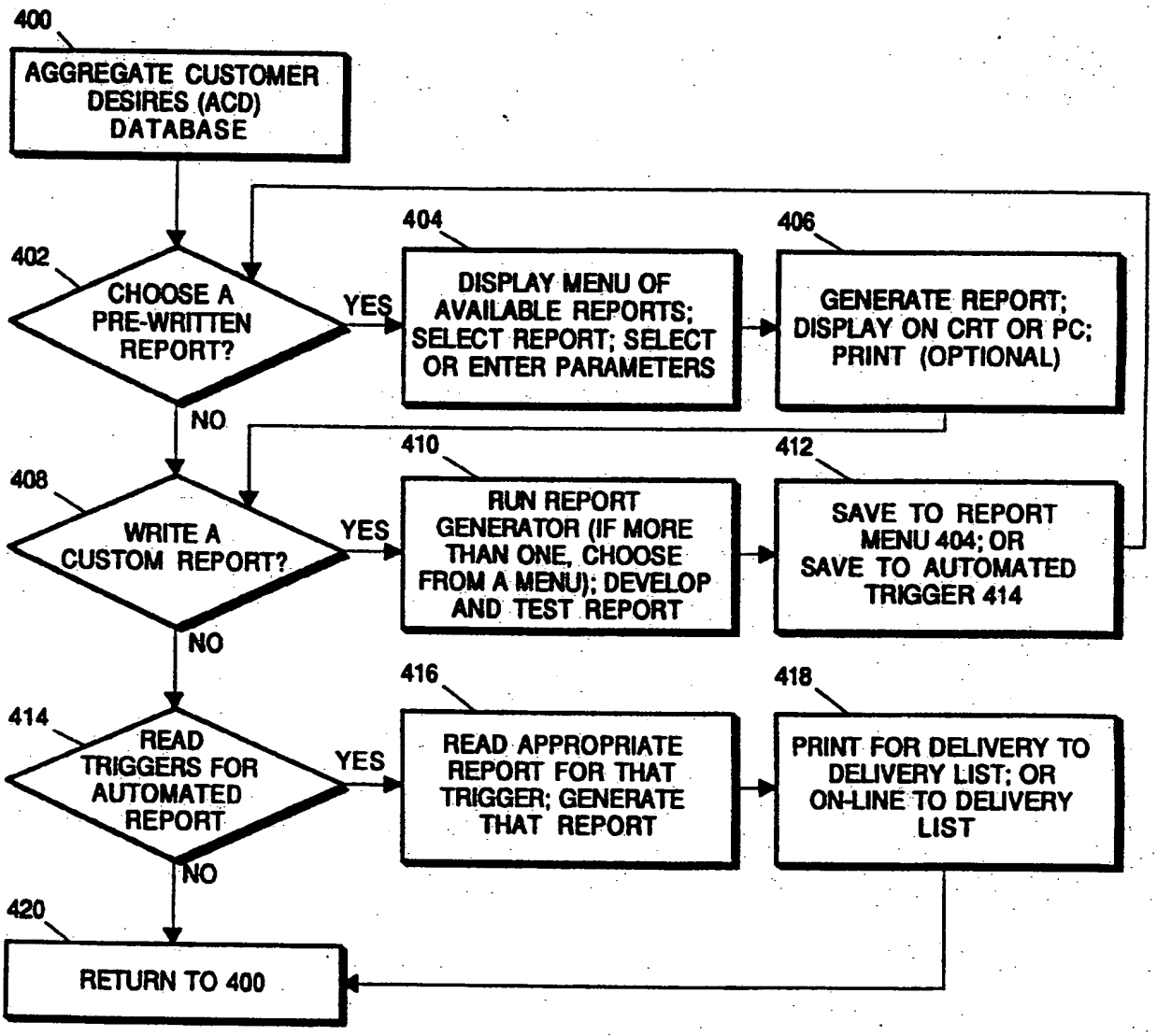

400
AGGREGATE CUSTOMER DESIRES (ACD) DATABASE
402
CHOOSE A PRE-WRITTEN REPORT?
YES
404
DISPLAY MENU OF AVAILABLE REPORTS; SELECT REPORT; SELECT OR ENTER PARAMETERS
406
GENERATE REPORT; DISPLAY ON CRT OR PC; PRINT (OPTIONAL)
NO
408
WRITE A CUSTOM REPORT?
YES
410
RUN REPORT GENERATOR (IF MORE THAN ONE, CHOOSE FROM A MENU); DEVELOP AND TEST REPORT
412
SAVE TO REPORT MENU 404; OR SAVE TO AUTOMATED TRIGGER 414
NO
414
READ TRIGGERS FOR AUTOMATED REPORT
YES
416
READ APPROPRIATE REPORT FOR THAT TRIGGER; GENERATE THAT REPORT
418
PRINT FOR DELIVERY TO DELIVERY LIST; OR ON-LINE TO DELIVERY LIST
NO
420
RETURN TO 400

FIG. 13

Probe #12: Feature that calculates Net present Value — 430

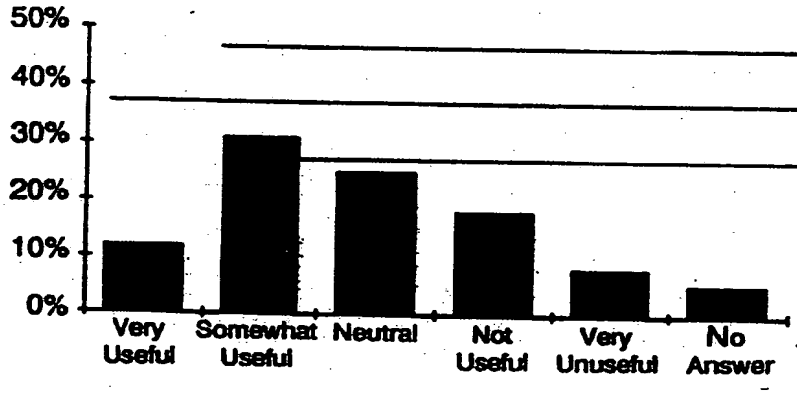
How useful did you find this method of performing this type of calculation? — 432

434

436

438

Very Useful	12%	423
Somewhat Useful	31%	1,086
Neutral	25%	884
Not Useful	18%	642
Very Unuseful	8%	287
No Answer	5%	191



440

442

444

446

Customer comments: — 448

Please explain how this calculation method helped or hindered your work: — 450

1 Gives a good understanding of the interaction between different financial measures — 452
1 I could experiment with the variables

2 This is easy to understand
2 Gave me a better understanding of the numbers
2 It focused on the key elements so I could think about the sensitivity points

3 Somehow the method and my numbers were not related. Although I spent time on it, it didn't help my descision.
3 Too easy to miss the big picture because of data overload. Too many numbers to manipulate.

4 There seemed to be more than was necessary.
4 Should be more instructive.

5 Help!

No Answer Can see consequences of different assumptions — 454
No Answer Helped understanding but too too many tries

FIG. 14

INTERNATIONAL SEARCH REPORT

[redacted]

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) : G06F 15/28; H04N 7/00; G06F 15/20
US CL :364/401; 358/84; 235/375
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/401; 358/84; 235/375

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,4603232 (KURLAND ET AL.) 29 JULY 1986 (see entire document)	1-9,12,15-17,47/1,47/17
Y	US,A,4851999 (MORIYAMA) 25 JULY 1989 (see entire document)	1-9,12,15-17,47/1,47/17
Y	US,A,5023435 (DENIGER) 11 JUNE 1991 (see entire document)	1-9,12,15-17,47/1,47/17
Y	US, A, 5041972 (FROST) 20 AUGUST 1991 (see entire document)	1-9, 12, 15-17, 47/1, 47/17

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be part of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 January 1994	11 JAN 1994
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. NOT APPLICABLE	Authorized officer XUONG CH[illegible] Telephone No. [illegible]05-9772

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/07341

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5109337 (FERRITER ET AL.) 28 APRIL 1992 (see entire document)	1-9, 12, 15-17, 47/1, 47/17
Y	US, A, 4908761 (TAI) 13 MARCH 1990 (see entire document)	1-9, 12, 15-17, 47/1, 47/17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/07341

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-9,12,15-17,47/1,47/17

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

Group I. Claims 1-9,12,15,16,17,47/1and 47/17 drawn to a product sub- system that interact with a user, classified in class 364/401.

Group II. Claims 18-23 amd 48/18 drawn to a data processing system for constructing interaction with a product's user, classified in class 364/401.

Group III. Claims 24; 26/24; 27/24; 28/24; 29/24; 25; 26/25; 27/25;28/25; 29/25 and 30 drawn to an apparatus for linking a product sub-sustem with a vendor's computer, classified in class 364/401.

Group IV. Claims 31-38 and 48/31 drawn to a data processing system that is built-into products and services to interact with a user, classified in class 364/401.

Group V. Claims 39-40 drawn to a data processing system for concurrently processing plural sets of information and reporting the resulting analyses and reports to vendor employees, classified in class 364/401.

Group VI. Claims 41 and 42 drawn to a method for the users of product and services to interact with product and services.

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